▶ ICA PREVIEW

AT&T may steal show

By Jim Brown and Michael Fahey

ATLANTA — In what has been called a retrenchment year for communications users and vendors, AT&T Chairman James E. Olson's keynote address at the upcoming International Communications Association (ICA) show may be of more interest to visitors than ICA's new product offerings.

Although the topic of Olson's address to the 39th edition of the ICA annual meet has not been disclosed, analysts predict he will announce major changes in AT&T's strategy. Olson, who last week was appointed chairman of AT&T, is expected to explain his company's recent re-

See **ICA** page 41

▶ INDUSTRY ACTION

Wang devours Intecom

BY SHARON SCULLY
Senior Editor

ALLEN, Texas — Two days after a large-scale product and strategy rollout, Intecom, Inc. announced last week it had reached a reported $156-million agreement with Wang Laboratories, Inc. by which it would become a wholly owned subsidiary of the office systems giant.

At the company's headquarters here, Intecom Chairman and Chief Executive Officer C. Michael Bowen said last Tuesday that Intecom

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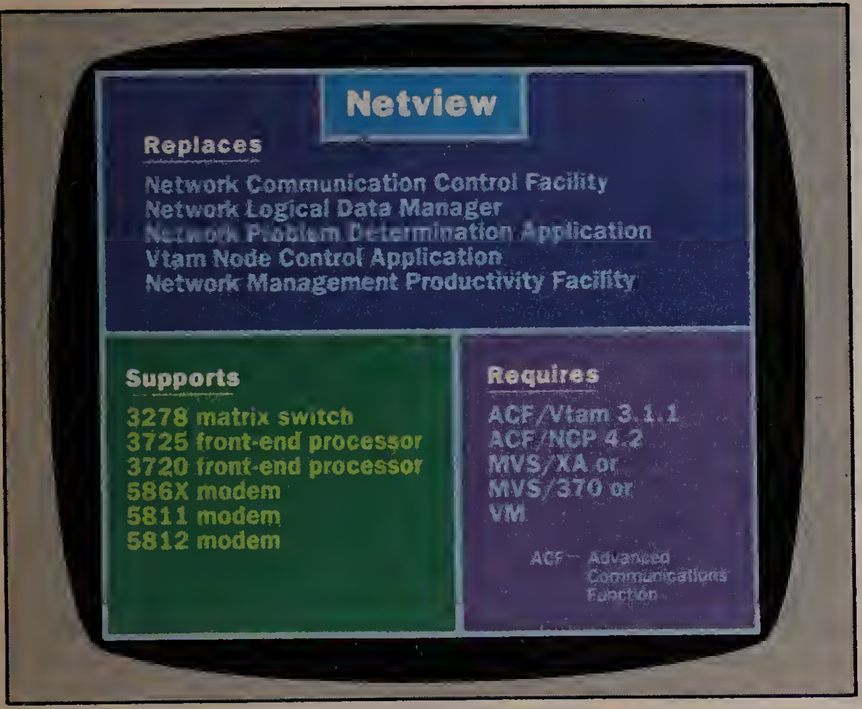
NETWORK WORLD
THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES VOLUME 3, NUMBER 12 MAY 26, 1986

Big Blue's view of network management



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- Network Communication Control Facility
- Network Logical Data Manager
- Network Problem Determination Application
- Vtam Node Control Application
- Network Management Productivity Facility

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- 3725 front-end processor
- 3720 front-end processor
- 586X modem
- 5811 modem
- 5812 modem

Requires
- ACF/Vtam 3.1.1
- ACF/NCP 4.2
- MVS/XA or
- MVS/370 or
- VM

ACF — Advanced Communications Function

▶ EXCLUSIVE

IBM's Terry R. Lautenbach

Terry R. Lautenbach, IBM vice-president and president of its Communication Products Division, is the latest IBMer to inherit the sobriquet "Mr. Telecom." That title means he is in charge of coordinating Big Blue's corporate communications strategies at a time when IBM is under unprecedented pressure to roll out new products and services.

Lautenbach's resumé with Big Blue

Continued on **page 36**

▶ BIG BLUE

IBM unleashes product onslaught

IBM, NCR declare front-end war.

BY PAUL KORZENIOWSKI
Senior Writer

Competition in the normally cool front-end processor market heated up last week as IBM and NCR Comten, Inc. expanded their product lines.

As expected, NCR Comten — IBM's chief competitor in the front-end processor market — unveiled on May 19 its 5660 ("NCR tackles IBM," *Network World*, May 12), a behemoth of a front-end processor that boasts up to 16M bytes of main storage memory and is capable of supporting 1,024 lines.

Just one day later, IBM responded in force by launching a low-end family of front-end processors, enhancements to its 3725, an upgraded release of Vtam and other associated front-end processor software products.

"Users should stay tuned, the front-end processor wars are just starting to be waged," said Vince Barrett, vice-president of the Stamford, Conn.-based research firm Gartner Group, Inc.

See **IBM** page 6

IBM unifies network management tools.

BY PAUL KORZENIOWSKI
Senior Writer

RYE BROOK, N.Y. — IBM made good on three big promises last week.

Big Blue moved to integrate its current collection of inharmonious network management tools. Its VM operating system was granted full Systems Network Architecture status through a new release of Vtam. And IBM began offering in the U.S. an SNA link to X.25 packet-switched networks that had been available in Europe for a year.

Because network management systems have grown up around net components such as modems and switches, each element has been controlled by an individual workstation. Net operators have worn out many pairs of shoes walking from one terminal to another attempting to isolate problems. Users needed a system that would control all net components from one console.

IBM replaced a number of net management packages with a single product — Netview. The

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IBM is trying to gather the entire clan under one SNA umbrella. Page 32.

▶ E-MAIL

DEC X.400 tool debuts

Firm becomes first major computer vendor to offer messaging standard.

BY JOHN DIX
Senior Editor

LITTLETON, Mass. — Digital Equipment Corp. became the first major computer manufacturer to support the CCITT X.400 electronic mail standard with the introduction of its Message Router X.400 Gateway last week.

DEC unveiled the messaging software in conjunction with networking software that conforms to the International Standards Organization's (ISO) Open Systems Interconnect (OSI) network model. In June 1985, DEC pledged to migrate DECnet, its proprietary network, to the OSI standard within three years.

> *“Adoption of X.400 is a key component of DEC's strategy.”*

Adoption of X.400 is a key component of DEC's migration strategy. Vendors across the board have voiced support for the standard as a way to link disparate proprietary E-mail systems with each other and with wide-area network mail services.

Users of the E-mail component of DEC's All-In-1 integrated office system will be able to communicate with messaging systems from other vendors when those systems support an X.400 gateway.

The Message Router X.400 Gateway supports an Ethernet interface for local connections and an X.25 interface for wide-area packet-switched networks.

The gateway conforms to several profiles of the X.400 standard, including the NBS/X.400, the Cept A311 and the Cen/Cenlec A3211. “The X.400 recommendation from CCITT contains options and fields of undefined lengths,” explained Joseph V. St. Amand, chairman of the National Bureau of Standards' (NBS) X.400 special interest group and chief OSI strategist with Wang Laboratories, Inc. “A311, A3211 and the NBS documents are to be used in addition to X.400 to specify exactly how to implement the protocols,” he said.

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▶ THE INDUSTRY

AT&T shuffles leadership

BY SHARON SCULLY
Senior Editor

NEW YORK — AT&T's board of directors last week accepted the August retirement of Charles L. Brown, the chairman and chief executive officer who engineered the breakup of the largest telecommunications monopoly in the world.

James E. Olson, who has played point man between Brown and the heads of the company's chief operating units — AT&T Communications, Inc., AT&T Information Systems and AT&T Technologies, Inc. — was named to succeed Brown as chairman in September. Olson will assume the role of chief executive officer next month.

Brown noted at the board's meeting that the stewardship of both the network services and customer equipment units will be combined under Randall L. Tobias, who is currently serving as the chairman and chief executive officer of AT&T Communications. Tobias will retain that title and take on the same role at AT&T Information Systems this September.

The appointment of Tobias was said to underscore the company's goal of reuniting the services and equipment sides of its organization into a single market presence. That type of reorganization is facilitated by the Federal Communications Commission's recent Third Computer Inquiry ruling, which eliminated so-called separate subsidiary requirements.

Robert E. Allen, who has presided as chairman over AT&T Information Systems and an often dramatic cost-cutting mission, was named president and chief operating officer of AT&T.

At a press briefing later, Brown, in his characteristic heartfelt style, called himself a lame duck and relinquished the podium to Olson, saying, “Jim, it's all yours.”

Emphasizing his more aggressive style, Olson launched into a categorical three-minute statement on the company's strategy, punctuated by use of the word “winning” at least eight times.

Olson, who more than anyone on the AT&T management team has been weaving an intricate strategy web out of the forces of regulation, government and the company's own internal politics, praised Brown's stewardship — one the media has often portrayed as indecisive and devoid of direction.

In an impassioned response to a reporter's question, Olson challenged a suggestion that Brown was “not the type of cheerleader the company needed.”

Olson said no chief executive officer in the U.S. could have done a “more magnificent” job.

“He was thoughtful; he was gutsy; and he was decisive,” Olson said. “He made the key decision back in 1982 that ended with divestiture.

“It was the only option that made any sense for all the constituencies we had to worry about,” he continued. “He's taken us through a whole restructuring . . . into a very focused line of business structure. Our styles and personalities are quite different; but that's the strength of any company.”

Olson several times asserted that the company's strategy would le-

See **AT&T** page 41

Further AT&T cuts

WASHINGTON, D.C. — AT&T announced last week an additional $450-million rate cut above and beyond the $1.5-billion reduction it announced last month. If approved, the total rate reductions scheduled to go into effect June 1 would total $2.1 billion.

The new rate cuts were made possible by further reductions in access charges local telephone companies levy on long-distance carriers, revised projections of how lower prices would stimulate additional calling and efficiencies realized within the company AT&T has elected to pass on to customers.

▶ LOCAL DEREGULATION

Iowa untangles Centrex

BY MARGIE SEMILOF
Senior Writer

Last in a three-part series.

When the Federal Communications Commission deregulated customer premises equipment on Jan. 1, 1983, the Iowa State Commerce Commission (ISCC) wasted no time in beginning to unravel local communications regulations. Most notably, Iowa became the first and only state to deregulate Centrex services — a move that initially drove up their cost and forced local telephone companies to battle user migration to private branch exchanges.

Hundreds of small, nonregulated phone companies already existed in Iowa, so the tradition of local regulation of utilities was not as deeply rooted as it was in other states. By the end of 1983, Iowa had deregulated inside wiring, pay telephones and Centrex service as part of the general deregulation of terminal equipment.

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Who's Responsible?

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▶ CONFERENCE NOTES

Rules top show talk

BY MARY PETROSKY
West Coast Correspondent

ATLANTA — In the wake of the Federal Communications Commission's Third Computer Inquiry order, discussions of regulatory issues nearly overshadowed technology talk at the Eastern Telecommunications Show held here last week.

The United States Telephone Association (USTA), which cosponsored the show with the U.S Telecommunications Suppliers Association, has gone on record saying the regulations are still too binding. These sentiments were echoed by executives from a number of the former Bell operating companies, including keynote speaker John Clendenin, chairman and chief executive officer of BellSouth Corp., headquartered in Atlanta.

"I applaud the FCC's decision to do away with the separate subsidiary requirement for the provision of enhanced services by the Bell operating companies and AT&T. But let me add, with equal emphasis, that we regard the decision as only a first step," Clendenin told attendees. "I am disappointed that a number of issues I hoped the FCC would resolve are being deferred to a supplementary proceeding."

These issues include questions of regulatory treatment of multiplexing equipment and protocol conversion, as well as the distinction between basic and enhanced services. Clendenin and other operating company representatives claim users have been denied some new services, such as voice messaging, because of these restrictions.

"All we want is a level playing field," said Carl Bailey, a vice-chairman of USTA and president of South Central Telephone Co., based in Birmingham, Ala. "If consumers are to share in this technology, we don't think the local operating companies should be precluded from providing these services," Bailey said.

The concept of comparably efficient interconnection (CEI) is key to providing enhanced services, according to Ron Adamson, director of new business development at San Franciso-based Pacific Bell. CEI is a safeguard being considered by the FCC that would require BOCS to give service providers equal access to their nets.

Another safeguard, the need to provide an open architecture, also provoked considerable comment. BellSouth's Clendenin said full structural separation wouldn't be achieved until the network providers have an open architecture. Network providers are required to submit plans for achieving an open architecture by February 1988.

None of the operating companies indicated that they were looking to

See **Rules** page 41

▶ EASTERN TELECOMMUNICATIONS SHOWCASE

ISDN schemes spotlighted

BY MARY PETROSKY
West Coast Correspondent

ATLANTA — Announcements of so-called pre-integrated services digital network products as well as actual ISDN products highlighted the Eastern Telecommunications Showcase held here last week. The show is cosponsored by the U.S. Telecommunications Suppliers Association and the U.S. Telephone Association.

Nashville-based Northern Telecom, Inc. announced an agreement with Motorola, Inc. to develop a family of semiconductor components for use in ISDN networks. Motorola will design the components using specifications from Northern Telecom. The first chip sets will include a CCITT-defined S and T interface, for use in both ISDN terminal and network equipment, and a U interface device for network termination and digital-line card applications.

The S interface is between a terminal and a private branch exchange-type switch; the T interface is between the switch and a network channel termination device on the customer's site or at the telephone company. The U interface connects that device to the network. Currently, the U interface has not been completely defined, but both companies say they will modify the chip design as stan-

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▶ THIRD COMPUTER INQUIRY

Users voice concerns

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — While the Bell operating companies and AT&T were generally enthusiastic about the Federal Communications Commission's recent Third Computer Inquiry ruling, users and industry observers are worried that the withdrawal of separate subsidiary requirements may encourage anticompetitive behavior.

Computer III eliminates the structural separation safeguards that required the BOCs and AT&T to offer enhanced services through separate subsidiaries. Computer III will institute so-called nonstructural safeguards, such as new accounting measures, that are designed to prevent cross-subsidization of new, perhaps unprofitable, ventures with the profits of basic regulated telephone service.

Federal regulators decided the separate subsidiary rules stifled competition and technological innovation.

With Computer III, the FCC allowed the BOCs and AT&T to offer enhanced services through their main business units but imposed accounting safeguards designed to track the costs and profits of new business ventures.

Industry groups such as the Ad Hoc Telecommunications Users Group (AHTUG) expressed concern over how the FCC will implement these nonstructural safeguards. "For most users, the important part of Computer III will be the cost accounting meaures adopted," said James Blaszack, an attorney representing the AHTUG.

The FCC instituted an inquiry into the accounting measures in April. Once adopted, the accounting rules will be incorporated into Computer III.

Many large corporate telecommunications users say accounting measures are not enough to prevent the BOCs and AT&T — with their monopolistic positions — from subsidizing new ventures with the profits of their successful telephone service.

The FCC tried to impose cost accounting measures once before under Computer I, said Richard Levine, a telecommunications analyst with the Washington, D.C.-based Touche Ross & Co.

"The general feeling has been that accounting safeguards are not enough to protect the ratepayer from monopolistic abuses. AT&T and the BOCs must overcome the skepticism of the past and institute accounting safeguards that are adequate to prevent cross-subsidization." Levine spoke at a Touche Ross seminar last week on the new FCC-proposed accounting measures.

Some opponents of the nonstructural safeguards say the BOCs and AT&T can manipulate accounting data to convince the FCC that cross-subsidization is not occurring.

"As long as the BOCs and AT&T have monopolistic positions, there will be a tremendous opportunity to cross-subsidize, and no accounting measures are going to stop that," said Nina Cornell, an economic consultant and former head of the FCC's Policy and Plans division.

The new accounting measures will also require a great deal more work on the part of the FCC.

"The FCC will not be able to guard against cross-subsidies without a new army of regulators and accountants," said Edwin Spievack, president of the North American Telecommunications Association. ■

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"ABC membership applied for"

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▶ EUROCOMM '86

OSI push obstructed

BY BRUCE HOARD
Editor

AMSTERDAM — "What does OSI really mean to me?" That is the question European communications users face first and foremost when planning their networking futures, according to two expert observers at last week's Eurocomm '86 conference here.

Al Dunn, director of the Yankee Group Europe, and Julian Patterson, an analyst with the same firm, said that uncertainty over the International Standards Organization's Open Systems Interconnect (OSI) model is directly attributable to discordant European Community (EC) politics.

The 12-member EC is the successor to the European Economic Community. It includes the UK, France, West Germany, the Republic of Ireland, Spain, Portugal, Luxembourg, Denmark, Italy, Austria, The Netherlands and Greece.

Although EC officials at the show offered hope for uniting the fractious countries under a single communications umbrella, Dunn was less sanguine. "It'll take time, a long time," Dunn declared. "I'm not really sure if the European companies can cooperate."

He emphasized the problem of vendor incompatibility by recalling a recent conversation he held with representatives of a large European private branch exchange supplier who complained of having to meet 300 specifications to satisfy the demands of EC countries.

On the governmental side, Dunn said the state-run Postal Telephone and Telegraph communications providers also compete against one another for international traffic, while ostensibly working toward Pan-European unity.

Asked to comment on OSI vs. IBM's Systems Network Architecture in Europe, Dunn said people who believe OSI will stop SNA are deluding themselves. "They'd be better off trying to add function to IBM," he said.

However, Dunn scorned Big Blue for advertising its compatibility with the first five layers of the OSI model. "It means zilch to users," he said.

That comment was contrasted in a statement made at a Eurocomm session by Gerrit Jeelof, vice-chairman of N.V. Philips. Jeelof appeared to be less interested in users than vendors when he called for unified standards only at the lower layers.

"The upper layers, however, are those that offer opportunities for diversity," Jeelof observed. "Users will demand such diversity in order to offer a competitive advantage to their customers."

Dunn disagreed, saying vendors, not users, stand to benefit from such a scenario.

Dunn's Yankee Group Europe colleague Patterson also pointed out the avaricious attitude of European vendors regarding X.400, the international messaging standard based on the OSI model. "X.400 starts to create a homogenized network that includes telex and eventually things like facsimile, which threatens the discrete marketing of those services," he said.

Stated differently, the PTTs make more money offering individual services than they do on combined services. Europeans have not taken all this adversity lying down, however. According to Jeelof, Spag has established a software conformance testing company that will be sponsored by "at least eight" EC companies and that may receive assistance from the EC. ◼

▶ NETWORK ALTERNATIVES

AT&T starts Vsat service

BY BOB WALLACE
Senior Writer

WASHINGTON, D.C. — AT&T Communications, Inc. launched its very small aperture terminal (Vsat) satellite network service last week after the Federal Communications Commission declined to delay the offering a fourth time.

The FCC denied bids by Equatorial Communications Co. of Mountain View, Calif., MCI Communications Corp. of Washington, D.C., GTE Spacenet Corp. of McLean, Va., and Private Satellite Network, Inc. of New York to reject or further delay AT&T's transmit and receive satellite service offering, which was unveiled in March. The service became available to users last week as a result of the FCC decision.

In response to competitors' concerns, the FCC ordered AT&T to account separately for revenue, costs, investments, net earnings and other financial information associated with the fledgling service. AT&T

See **Vsat** page 43

AVANT-GARDE

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▶ LABOR NOTES

CWA threatens strikes amid stalled talks

AT&T may be in for trouble if no deal is reached by end of contract negotiations.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — By a six-to-one margin, members of the Communications Workers of America (CWA) last week gave union President Morton Bahr authority to order a strike against AT&T if a settlement is not reached by the scheduled end of ongoing contract negotiations on May 31.

If a strike is called, the impact on AT&T and its customers is expected to be minimal. There could be some minor delays in service and in the installation of new lines and customer premises equipment.

Those effects may be aggravated if the strike is drawn out. The strike could shut down AT&T's manufacturing facilities, but analysts say extensive inventories could help the company weather the labor action.

Last week's so-called strike vote does not mean a strike will automatically be called by the union. Typically, such a vote is taken before the end of negotiations when talks are not going smoothly, according to a union representative.

"At this late stage, AT&T has yet to bargain seriously and address issues of concern to our members," Bahr said. "The only formal management proposal on the table is a package of unacceptable givebacks. If AT&T continues along this path, we're headed for a confrontation."

The current three-year CWA contract with AT&T, which involves some 155,000 workers, will expire on May 31. The contract talks, which got under way here in early April, are the first since the breakup of the Bell system. The CWA will begin contract negotiations with individual Bell operating companies once the AT&T talks are completed. AT&T is also holding contract negotiations with the International Brotherhood of Electrical Workers.

AT&T has asked CWA union members to give up certain benefits won in earlier contract negotiations. Areas of contention include portions of the company-paid medical insurance plan and changes in some workers' job classifications.

The topics of job security and wages have yet to be addressed.

Front-end from **page 1**

Barrett noted that growth in this market is expected to remain flat for the next 12 to 18 months. He said IBM's introduction of the low-end front-end processors is a clear attempt by Big Blue to squeeze NCR out of that market. "I don't think it is a coincidence that last month IBM announced Token-Ring Network support for the 3725 right after NCR enhanced its X.25 front-end processor offerings or that IBM unveiled its low-end front-end processor a day after the NCR 5660 announcement," he said.

The 5660 announcement enabled NCR to gain ground in an area where it has lagged behind IBM — front-end processor software. Front-end processors run operating software that works in conjunction with host telecommunications software such as IBM's Vtam.

Until Monday, NCR's operating software trailed one or two releases behind IBM's. The NCR 5660 supports Vtam 3.1's extended addressing capability, which IBM announced in September 1984. Like the IBM product, the NCR 5660 expanded the number of devices a Systems Network Architecture net can support from 64,000 to eight million.

NCR did not hold the hard-won ground for long. Included in IBM's Tuesday announcements was Release 3.1.1 of Vtam, which works only with new IBM front-end processor software. Without the software, NCR users will be unable to use IBM's newly released network management offering, Netview.

In addition to forcing NCR to play catch-up once again, IBM put some heat on its competitor's low-end offerings, the NCR 5620 and 3650, by adding the 3720 line, a four-member family of small front-end processors.

The processors feature support for up to four hosts, the ability to connect to two other front-end processors and 1M bytes of storage expandable to 2M bytes. They also offer a 10M-byte hard disk for storing configuration data and support for a subset of IBM's latest front-end processor software, which supports all Vtam features except for System Network Interconnection.

Two models are designed for direct host attachment, the 3720 Model 1, which can support 28 to 60 lines, and the Model 11, which can support from 16 to 48 lines and two Token-Ring Networks.

Two other models, the Model 2, with the same line capacity as the Model 1, and the Model 12, with the capacity of the Model 11, are geared for use at remote locations and support dial-up connections to a host. Line speeds supported range from 50K bit/sec to 256K bit/sec. Prices for the 3720s range from $26,000 to $100,000.

IBM also beefed up the 3725 by adding more internal memory and increasing the efficiency of line utilization. Users can upgrade to the IBM 3725 for $2,700.

▶ CAPITOL VIEW

FCC nominee hits snarl

Congressional approval process for hopeful Diaz Dennis shifts into low.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — Once viewed as little more than a rubber-stamp action, congressional approval of Patricia Diaz Dennis, nominated to serve as a commissioner with the Federal Communications Commission, hit a stumbling block last week.

The 39-year-old Dennis was nominated by the Reagan Administration to fill the FCC post vacated recently by Commissioner Henry Rivera. Although she was expected to be approved by the U.S. Senate Commerce Committee shortly after her confirmation hearing last month, Dennis' confirmation has become entangled in a controversy related to a bill sponsored by Sen. Barry Goldwater (R-Ariz.) that would reduce the terms of FCC commissioners from seven to five years. The bill has already been approved by the Senate.

Democrats on the Senate Commerce Committee have said they will not vote on Dennis' appointment until Congress passes the "Terms" bill. That legislation is awaiting a vote from the U.S. House of Representatives. Sources say senators are using Dennis' appointment as a lever to force House action on the bill before filling the vacant post.

If the bill is approved, Dennis must still receive the approval of the full Commerce Committee before being approved by the Senate. If nominated, Dennis' first term is expected to be from one to three years, according to a Senate Commerce Committee staff member.

Dennis, a Democrat from New Mexico, is currently an attorney on the National Labor Relations Board in Washington, D.C.

▶ MODEMS

New IBM kids on block

BY PAUL KORZENIOWSKI
Senior Writer

RYE BROOK, N.Y. — In an effort to fill in crucial pieces of the network management puzzle, IBM introduced a line of modems last week that complements its concurrently announced Netview network management software.

Amid the continuing expansion of its rapidly growing line of communications offerings, Big Blue replaced its existing line of 5860 series modems last week and enhanced its family of short-haul modems. IBM also announced a Digital Service Unit, which supports communications from a host system to a digital line.

Four new models of the synchronous, leased-line 5860 modem series replace the current 5860 modems. The new modems include diagnostic capabilities required to work with IBM's Netview and enable a network operator to configure and manage modem connections more easily.

All 5860 series modems feature a two- or four-wire switched backup option that enables a network operator to reconnect a modem remotely by a dial-up line whenever a lease-line connection is lost.

The synchronous, full-duplex IBM 5866 Modem Model 2 and Model 3 operate at speeds up to 14.4K bit/sec and use trellis-coded modulation. They are equipped with an automatic fallback speed of 12K bit/sec and can be set to operate at 9.6K bit/sec. The IBM 5866 Model 2 supports synchronous transmission in half-duplex or full-duplex mode over four-wire leased lines and can be used for point-to-point or multipoint operation.

The IBM 5866 Model 3 includes the same features as the Model 2 plus a fan-out/fan-in capability. Fan-out supplies the modem with four data terminal interfaces so that several Data Terminal Equipment devices can be controlled on a multipoint line. Fan-in supports the connection of two communications controllers that work as backup facilities on a network. Rack-mounted versions of the models round out the 5860 series offerings. Modem prices range from $3,300 to $6,650.

On the short-haul modem front, IBM introduced the IBM 5812 and enhanced the IBM 5811.

The IBM 5812, which also works with IBM's Netview, supports synchronous and asynchronous transmission speeds from 2,400 to 19.2K bit/sec. The modem supports half- and full-duplex operation at a range of 7.5 miles when transmitting at a speed of 9.6K bit/sec.

The IBM 5811 limited-distance modem has been enhanced to support asynchronous transmission at speeds up to 19.2K bit/sec and synchronous speeds of 7.2K bit/sec and 14.4K bit/sec. Rack-mounted versions of both products are available. Prices for the modems range from $700 to $1,150.

The IBM 5821 Data Service Unit/Channel Service Unit Model 10 is designed for use with digital transmission facilities such as AT&T's Accunet and Dataphone Digital Service. The product operates at speeds from 2,400 to 56K bit/sec and includes RS-232, CCITT V.24 and V.35 interfaces. The IBM 5821 costs $850.

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Public Health Service, U.S. Department of Health and Human Services

Netview from **page 1**

software runs under MVS or VM and IBM's new Vtam 3.1.1., a new release. Netview works with IBM's enhanced modems (see accompanying story) to supply a more complete picture of device connections. It can also control IBM's 3728 matrix switch.

The package replaces the IBM Network Communications Control Facility, Network Logical Data Manager and Network Problem Determination Application. Netview also blends functions from Virtual Telecommunications Access Method Node Control Application and Network Management Productivity Facility. IBM's Network Performance Monitor, which monitors response time, is notably absent.

Netview compiles link analysis information through diagnostic routines and loop-back tests with remote modems. If a leased line is lost, a user can reconnect the modem from the central site through a new dial-up link feature.

Netview can also control an IBM 3278 matrix switch. Netview requires an IBM 3708 Network Conversion Unit, which sits between the matrix switch and a front-end processor. Netview also monitors IBM Token-Ring Network performance.

Although Netview filled many holes in IBM's net management strategy, a few remain. A major gap is the absence of control tools for T-1 lines. And, only IBM modems can be used to determine line problems. Unlike other modem manufacturers, IBM uses in-band signaling to intersperse diagnostic data with the main data channel. Other companies use a side frequency or out-of-band signaling.

Users have also said IBM's net management packages are cumbersome. IBM claims Netview is user friendly. Menus and help screens have been added, and the product is consistent in its use of function keys and colors to indicate net status.

A final constraint is that users will have to upgrade to a newer version of Vtam, ACF/Vtam 3.1.1 and its associated front-end processor software. Netview will not work with current versions of Vtam. Netview will be available in the fourth quarter; monthly licensing fees range from $705 to $1,255.

The new Vtam also adds SNA support for IBM's VM operating system. Previously, VM users had to run a guest operating system to use such Vtam features as System Network Interconnection and Extended Network Addressing. Vtam 3.1.1 supports those facilities without a second operating system.

IBM's X.25 System Network Interconnection enhances X.25 support in IBM 3725 or 3720 front-end processors. Previously, an X.25 terminal could be used to access SNA applications through IBM's Network Packet-Switch Interface. The new X.25 offering lets users construct an X.25 network and run it under SNA. System Network Interconnection will be available early in 1987 for $37,200.

Iowa from **page 2**

According to Sandra McKeefe, acting superintendent of the ISCC telephone section, the state ruled that any service deemed competitive was to be deregulated. To determine whether a service is competitive, the Bell operating company — Northwestern Bell — must participate in verification hearings before the ISCC.

This requirement limits the possibility of future deregulation of most private-line services because of the lack of competition within the state.

Immediately after deregulation, Centrex prices began to rise. Northwestern Bell countered the migration to PBXs by offering some users special deals.

Tony Crandell, deputy director of communications for the state of Iowa, recalled that when deregulation went into effect, the state communications department immediately began pricing PBXs. It did this in an effort to save the monthly per-line charge of about $15 that the state was paying for Centrex service.

"The local operating company placed an alternate bid to the state's PBX bids," Crandall said. "They reduced the per-line price to approximately $5.40. So the idea to buy a switch went back on the shelf. In addition to the lower bid, the BOC also offered a $100,000 rebate. Overall, our monthly billing was reduced about $30,000."

"We were using Centrex 2+, but we upgraded to Centron, a Centrex service with more features," he said.

"The BOC also gave us free customer access rearrangement service, which consists of an on-line terminal that allows us to move and change phone line configurations. With that deal, we were willing to sign a five-year contract with the BOC."

Northeastern Bell was unable to convince other users to keep their Centrex service. Many customers had simply outgrown the service and were looking for the increased capability that a private switch could provide. For them, any savings derived from owning a private switch would be an added bonus.

Roger Durkee, a spokesman for Peoria, Ill.-based John Deere Co., said the company was already replacing Centrex when local deregulation began to escalate prices. "The particular type of Centrex we used could not be upgraded to support additional features," he said. "So our decision to switch was based on cost and the need for new capabilities."

The University of Iowa also purchased its switch before the Centrex service was deregulated. William Cleveland, telecommunications manager at the university, said that $7 million will be saved over a 10-year period by using the university's own PBX instead of Centrex.

Cleveland said he noticed competition for local deregulated services such as inbound Wats had picked up.

INDUSTRY UPDATE

But will it sell?

Competition among regional Bell operating companies in the lucrative Yellow Pages directory business may yet teach these relatively green enterprises something about marketing promotion. While no one knows for sure how traditional Yellow Pages advertisers will choose among the geographically identical books, it is clear the zest for competition exhibited by the RBOCs makes for good, and free, promotion. Antics like what Nynex called a clerical error in omitting Southwestern Bell from its Manhattan telephone book have been publicized this month everywhere from national daily newspapers to prime-time evening news shows of all three major television networks.

▶ ANALYSIS

Firms offer US Sprint an intelligent network

Joint Tandem, Integrated Technologies venture could be first U.S. application of ISDN Signaling System Seven.

BY SHARON SCULLY
Senior Editor

Tandem Computers, Inc.'s president, James Treybig, made it a point to tell shareholders at the company's annual meeting this year that Tandem had performed well in spite of a flat economy, a claim most other Fortune 500 computer company executives could not make about last year.

It could well be that the company's continuing success selling large on-line transaction processing systems, coupled with a unique venture it entered into last year with software developer Integrated Technologies, Inc. of Plano, Texas, will raise more than shareholders' eyebrows.

While no details of the venture have been made public yet, Tandem and Integrated Technologies — in which Tandem bought a 20% interest last year — are now negotiating a final contract with US Sprint Communications Co. to install signal transfer and control points on the carrier's long-distance network.

If the deal is secured, the two systems could become the first U.S. application of the integrated services digital network signaling protocol, Signaling System Seven (SS7), in a major telecommunications network. And for all its well-publicized problems, US Sprint could be the first long-distance carrier able to truly compete with AT&T Communications, Inc. in the provision of full 800 services.

Last November, before it became US Sprint, GTE Sprint Communications Corp. contracted with Integrated Technologies to field test the signal control system at three of the its long-distance switch nodes, in Burlingame, Calif., Los Angeles and Honolulu. Although the system at those sites is being used to authorize Sprint credit card calls, it is capable of simultaneously controlling data bases for the provision of 800 services and virtual private network services. That capability, the companies claim, is unique.

Signal transfer and control points allow carriers, both local and long-distance, to, in essence, process the kinds of intelligent network services now being touted as ISDN services. Alone, the signal control points actually process enhanced features such as 800 service or virtual private network service on an SS7 network.

Without signal transfer and control points, carriers would be plagued by the kinds of difficulties recently uncovered by Sprint itself when it reportedly found that its billing software shortchanged the company's top line by between $10 million and $20 million.

Now, according to Tandem and Integrated Technologies, only their signal transfer and control points are capable of simultaneously processing more than one data base on a single SS7 network. That's impor-

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▶ INDUSTRY MOVES

Telecom Plus, US Telecom ink accord

Telecom Plus forges ahead in networking services market, attempts to compete on national scale with BOCs.

BY NADINE WANDZILAK
Staff Writer

BOCA RATON, Fla. — Telecom Plus International, Inc. last week announced it signed an agreement to resell interexchange network services of US Telecom, Inc. The agreement would be extended to include the interexchange network services of GTE Sprint Communications Corp. when the proposed partnership between GTE Sprint and US Telecom is finalized.

Telecom Plus' principal operating subsidiary, Tel Plus Communications, Inc. — a partnership of Telecom Plus and Siemens Information Systems — is to become a primary business agent to market US Telecom's business communications services, including long-distance, Wats-like services and virtual private nets.

The proposed US Telecom and GTE Sprint partnership is pending regulatory approvals.

Telecom Plus, one of the largest remaining independent interconnect contractors, is continuing an aggressive strategy of diversification into the network services markets, attempting to compete more effectively on a national level with the former Bell System companies.

These companies are also fighting regulatory restrictions on their ability to reunite the services and equipment segments of their business that divestiture forced apart.

Moreover, the deal with US Telecom follows agreements the company made last month with New York Telephone Co. and New England Telephone & Telegraph Co. to resell local loop network services of those companies.

The Federal Communications Commission granted Nynex Business Information Systems Co. a waiver enabling it to market jointly the network services of its regulated sister subsidiaries — the New York and New England phone companies — only on the condition that equal resale opportunities were made available to independent agents.

After the waiver was granted, some interconnect contractors and the North American Telecommunications Association charged the phone companies with intentionally delaying efforts to license their competition to resell the phone companies' network services.

▶ REGULATION

Dingell: restraints stifle BOCs

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — Regulatory restraints that prevent the Bell operating companies from competing in emerging new telecommunications markets could force private corporations to provide new communications services, according to Rep. John D. Dingell (D-Mich.), chairman of the House Energy and Commerce Committee and a member of the Telecommunications Subcommittee.

Speaking at the Computer and Communications Industry Association's recent annual caucus here, Dingell said that so-called privatization of new communications technologies might help large corporate telecommunications users, but would hurt small businesses and residential customers.

Dingell also said recent regulatory and industry trends have brought about enhancements in customer premises equipment at the expense of the public national telecommunications network. The effect of this has been to aid large corporations that can afford to invest in new technology and to hurt small businesses that rely on the public network.

A continuation of this trend could lead to a two-tiered information society, Dingell told a group of some 50 representatives from computer, semiconductor, telecommunications and data communications firms.

"The local telephone companies must be encouraged to upgrade the public network and develop advanced information systems," Dingell suggested. One way to do that, he said, would be to permit the BOCs to enter the enhanced services and manufacturing businesses, a concept that distressed some of those in attendance.

The House Telecommunications Subcommittee held hearings on the telecommunications industry earlier this year and gave its approval to further deregulation of the BOCs. Legislation sponsored by subcommittee Chairman Timothy Wirth (D-Colo.) would free the BOCs to enter enhanced services and manufacturing sectors.

Dingell lauded the Federal Communications Commission's recent Third Computer Inquiry initiative

See **Dingell** page 10

Dingell from **page 9**

(see "A new age of open access," *Network World*, May 19) while lashing out at the Department of Justice's stance toward BOC deregulation.

U.S. District Court Judge Harold Greene's and the Justice Department's policies have restricted the BOCs from offering information services, Dingell argued.

Dingell advocates "unshackling" the BOCs to allow them to compete in both the domestic market and "fierce global markets."

On the subject of international trade, Dingell said the current omnibus trade bill in the House is not protectionist, contrary to the claims of its critics. "It allows U.S. firms fair participation in global markets," he said. The Commerce Committee recently approved telecommunications trade legislation that would use the FCC as a foil to deny Japanese products certification for sale in the U.S. unless the Japanese market is opened to U.S. firms. This legislation is in competition with another House bill that would raise tariff barriers and impose quotas on the import of Japanese telecommunications equipment.

US Sprint from **page 9**

tant to a group of industry players who sometimes have difficulty deciding which service, 800 service or virtual private network service — to market first.

But what may be more immediately significant is the fact that, as it appears now, only Tandem and Integrated Technologies are actually delivering product to long-distance carriers or the Bell operating companies, all of whom have assigned different priorities to markets they need this technology to pursue and to protect.

Digital Switch Corp., which sells digital switching and transmission systems to long-distance carriers, recently began advertising that it can deliver SS7 software.

According to a company spokesman, the company has sold signal transfer points to the Allnet Communications Services, Inc./Lexitel Corp. merger, ALC Communications, but ALC would not confirm the transaction.

AT&T Network Systems Group is providing AT&T Communications with a 3B20-based signal control point system, but its only SS7 application is its 800 service. Sources say AT&T Network Systems is only selling the system to AT&T Communications in spite of a relatively mild exhortation from U.S. District Court Judge Harold Greene in January that the company make the data base system available to the BOCs.

Bell Communications Research, Inc. (Bellcore) is reportedly working with Digital Equipment Corp. to develop a signal control point system with SS7 software for which 800 service is also the sole application. According to a source, the project has been delayed and currently is only in alpha testing. It is unclear how far Bellcore is permitted to go in the development and sale of software-based systems to its seven owners. The seven RBOCs, who fund Bellcore, are still not supposed to manufacture communications equipment.

Last but not least, IBM also is "addressing this application area, but hasn't decided which processor to use," according to a source at Integrated Technologies. The Integrated Technologies employee said he had heard from customers that IBM is interested in developing signal transfer and control points. He also said Integrated Technologies has been working hard to sell to MCI Communications Corp., adding that IBM's plans in this area could "hit on exactly why we haven't closed anything there."

Also, there have been rumors IBM is interested in buying Digital Switch Corp., a subsidiary of DSC Communications Corp. A DSC spokesman flatly denied the rumor, and said the company would resolutely fight any merger, acquisition or takeover attempt. But recent financial problems could make the company an attractive takeover candidate. And the combination of IBM, MCI and Rolm Corp. with DSC would make for an interesting alliance.

But only Tandem is known to have delivered a product. That the company is now also working to develop its own signal transfer points is a new tact and could have something to do with the fact that some BOCs seem now, unlike earlier this year, to be dragging their feet on 800 service development.

According to Peter Walsh, Integrated Technologies' vice-president of marketing and Jerry Held, Tandem's director of strategic planning, the fact that the Tandem/Integrated Technologies system enables the user to access the same transport network for four separate, simultaneous applications would make it possible for the BOCs and the long-distance carriers to be more flexible in planning their own service rollout strategies. The pair say this is something a system based on IBM, DEC or AT&T computers would not be able to do.

Walsh said Tandem's distributed processing architecture is better suited to Tandem applications in the same physical system.

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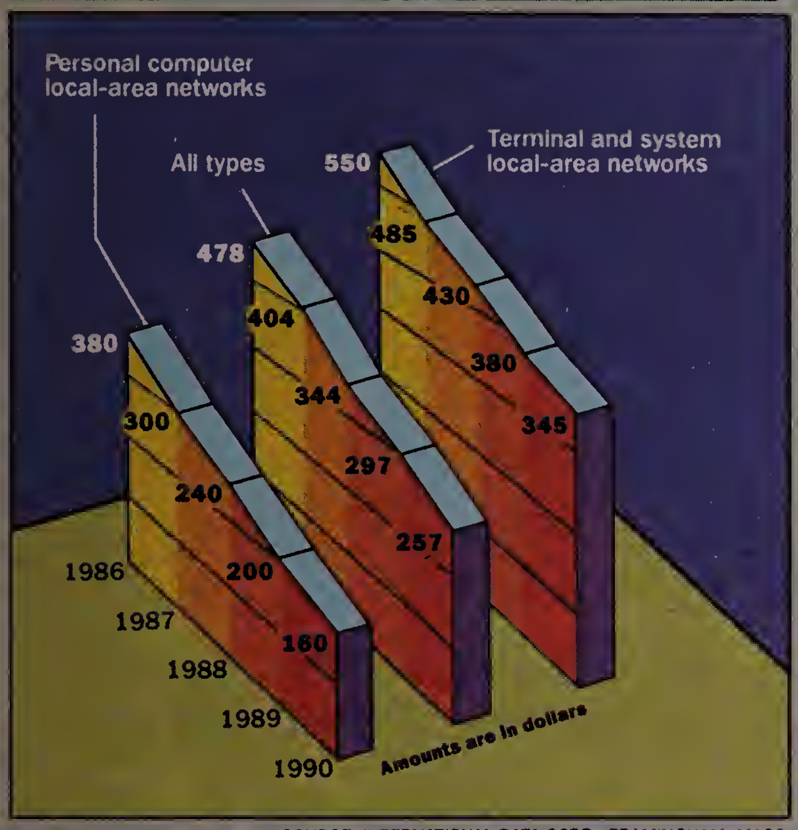
TELECOM TRENDS

Smart phone to debut

A new mobile phone from AT&T called the 1280 Cellular Telephone can store as many as 20 telephone numbers, which a driver can dial by simply speaking a person's name into the receiver. The device is designed to do this by programming in telephone numbers and assigning each a voice print of the corresponding person's name. The 1280 is scheduled to be available this summer and will cost $1,745.

Local networks: average price per workstation connection



SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

▶ BELL OPERATING COMPANIES

RBOCs strive for service waivers

Bell Atlantic wins FCC nod, as others strive for approval of protocol conversion plans.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — The Federal Communications Commission last week granted Bell Atlantic Corp. the right to offer protocol conversion on its packet network, making it the second regional Bell operating company to receive such approval.

Bell Atlantic and Ameritech are only the most recent companies to ask the FCC for approval to offer such services. Others seeking FCC approval include New Jersey Bell, New York Telephone Co. and Pacific Telesis Group. Only BellSouth Corp. currently markets a protocol conversion service.

According to William Maher of the FCC's common carrier bureau, the recently adopted FCC Third Computer Inquiry ["FCC hands down new industry rules," *Network World*, May 19] still requires carriers to file waivers to offer services with protocol conversion. The new FCC inquiry process is, in fact, virtually identical to the waiver process.

Besides the protocol conversion waivers carriers are seeking, Bell Atlantic and Ameritech want FCC approval for their compliance and cost allocation proposals.

See **Bell Atlantic** page 14

CROSS TALK
JOHN DIX

Market gyration leaves gaps

The dramatic growth of Argo Communications Corp., an upstart long-haul communications carrier, is exemplary of the rabid change in the long-distance service market.

Argo was formed in 1981 to serve small and mid-sized companies. It built its network of satellite, microwave and some fiber-optic transmission facilities and began offering service in May 1984. By the end of 1984, Argo's annual revenue was over $1.7 million. At the end of 1985, its annual revenue had grown tenfold to over $17 million.

The company does not expect to be profitable until the third quarter of this year, but a healthy sign of its strength is that monthly revenue in December was $2.4 million.

Argo is small-fry compared with industry leaders AT&T, whose long-distance revenue was $17 billion during the same period, and MCI Communications Corp., whose total revenue was more than $2.5 billion. But it is interesting that a newcomer could carve out a place in this competitive marketplace during a period of heavy industry consolidation.

While many of the traditional carriers are scrambling to find partners to fight the big two — witness the merger of GTE Sprint Communications Corp. with US Telecom, and Allnet Communication Services with Lexitel Corp. — small and agile companies have been able to rustle up business.

> *"Argo was formed in 1981 to serve small and mid-sized companies."*

The influx of new carriers is resulting, predictably, in marketing battles. Discounts are available with many carriers, and they are becoming more common every day. ITT Corp.'s Communications Services Group announced this month it will waive installation fees and give new private-line users a free month's worth of service for signing on. The company estimates savings at roughly $900 per circuit.

Even the big carriers are playing the game. When MCI tariffed its Vnet software-defined network service a few weeks ago, it waived the $5,000 per site installation fee and a $2,500 per month service fee for eight months, for customers that sign up before Sept. 1.

No matter how sweet the enticement, users should be more wary than ever of the viability of young or small carriers. Too much caution, however, can cost money. While many of these carriers are probably too risky to rely on as a primary carrier, little is risked bringing a small discount carrier in to pick up spillover traffic. Optimal reliance on these carriers could be calculated by weighing the financial benefits against the vulnerability such reliance would breed.

In short, users may be able to shave a few percentage points off their monthly bills and incur little risk by installing a few circuits from a small niche, regional or hungry start-up carrier.

▶ LONG-DISTANCE

Hello Pro America

Service underway.

BY JOHN DIX
Senior Editor

AT&T Communications, Inc. activated its Pro America discount long-distance pricing plan recently after the Federal Communications Commission denied bids by AT&T competitors to stall the tariff for further study.

Pro America discounts AT&T interstate direct-dialed long-distance calls 10% for a flat $15 monthly customer fee. The discount applies around the clock and is above and beyond existing time-of-day discounts.

AT&T said the plan is aimed at small and mid-sized businesses whose bills average more than $150 per month. While large customers rely primarily on private lines, Wats and other high-end services, as much as 15% of a large company's traffic may overflow to standard Message Toll Service, according to Page Montgomery, vice-president of Economics & Technology, Inc., a Boston-based company that analyzes tariffs. With Pro America, users may realize an overall monthly bill reduction of 1% to 2%.

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▶ SATELLITE NETS

FCC streamlines one-way Vsat rules

Agency decrees satellite antennas pose no interference threat.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — Users of Equatorial Communications Co.'s Intelnet I service will not have to license their receive-only satellite antennas, thanks to a recent decision by the Federal Communications Commission.

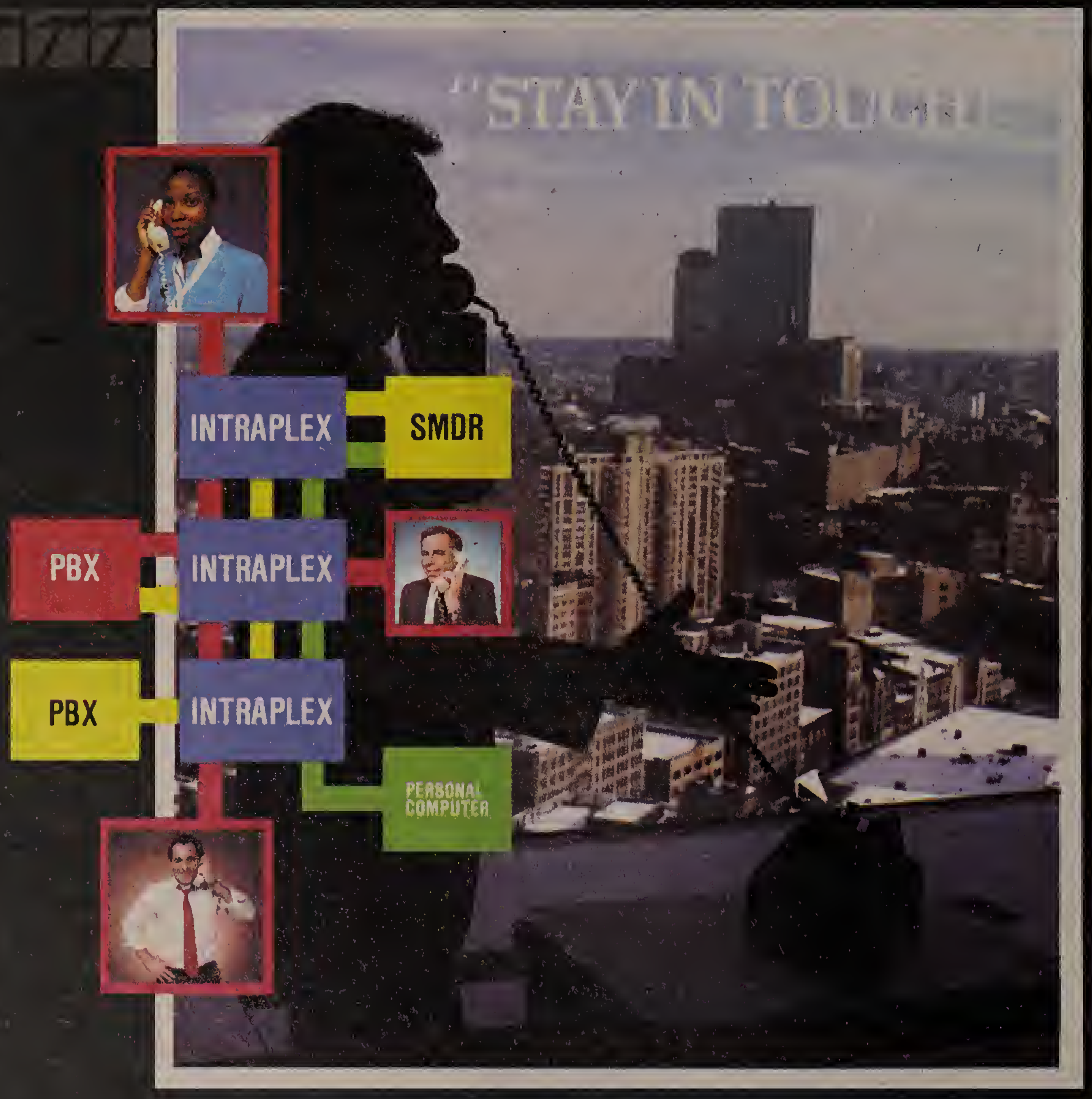
Federal regulators eliminated licensing requirements, saying the earth stations are small, passive receiving devices and pose no threat of radio wave interference.

Intelnet I is a point-to-multipoint international satellite service. Intelnet is offered in the US through Communications Satellite Corp. (Comsat).Equatorial buys its space segment capacity from Comsat.

Equatorial is the only U.S. firm offering Intelnet, which utilizes spread-spectrum technology and the C-band frequency.

The service is suitable for financial institutions and news services that must transmit information from abroad to U.S. recipients. The only part of the network that must be licensed is the master earth station transmitting the information.

Intelnet II is a transmit and receive service that still requires FCC licensing. Earth stations using Intelnet II must file for individual earth station licenses, although the FCC streamlined the processing of those applications last fall. ◘



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Bell Atlantic from **page 11**

In November, the FCC issued an order allowing the telephone companies to offer asynchronous-to-X.25 protocol conversion, provided they would not cross-subsidize the service with revenue from their more profitable basic telephone service.

Under current FCC protocol conversion regulations, the BOCs must fulfill three so-called collocation measures. They must charge themselves for interoffice channels at tariffed rates. They must also calculate and charge separately for the packet-switching and protocol conversion services — a requirement that essentially creates a surcharge for the protocol conversion portion of service.

The companies also must afford competitors the same quality of access to their packet-switching networks as the BOCs themselves enjoy.

The BOCs are also required by the FCC to provide a full accounting of their cost allocation plans. The latter is to ensure that the protocol conversion service will not be cross-subsidized by the BOCs' more profitable businesses. That would give the BOCs an unfair advantage over their competition.

Prior to the FCC's 1985 rulemaking, BOCs were required to establish separate subsidiaries to market enhanced services such as those that provide protocol conversion.

The BOCs must file for state tariff approval for the packet-switching portion of the service. The protocol conversion segment of the service is not tariffed. The BOCs are not required to file a tariff with the FCC but can reference the state tariff when asking for FCC approval of the service.

Ameritech is awaiting state tariff approval in Michigan as well as FCC approval for its service. While Bell Atlantic has received FCC waiver approval, it still has to have its tariffs approved for its Public Data Network. Pacific Telesis is also in the early stages of the regulatory process. Its service will be called Public Packet Switching.

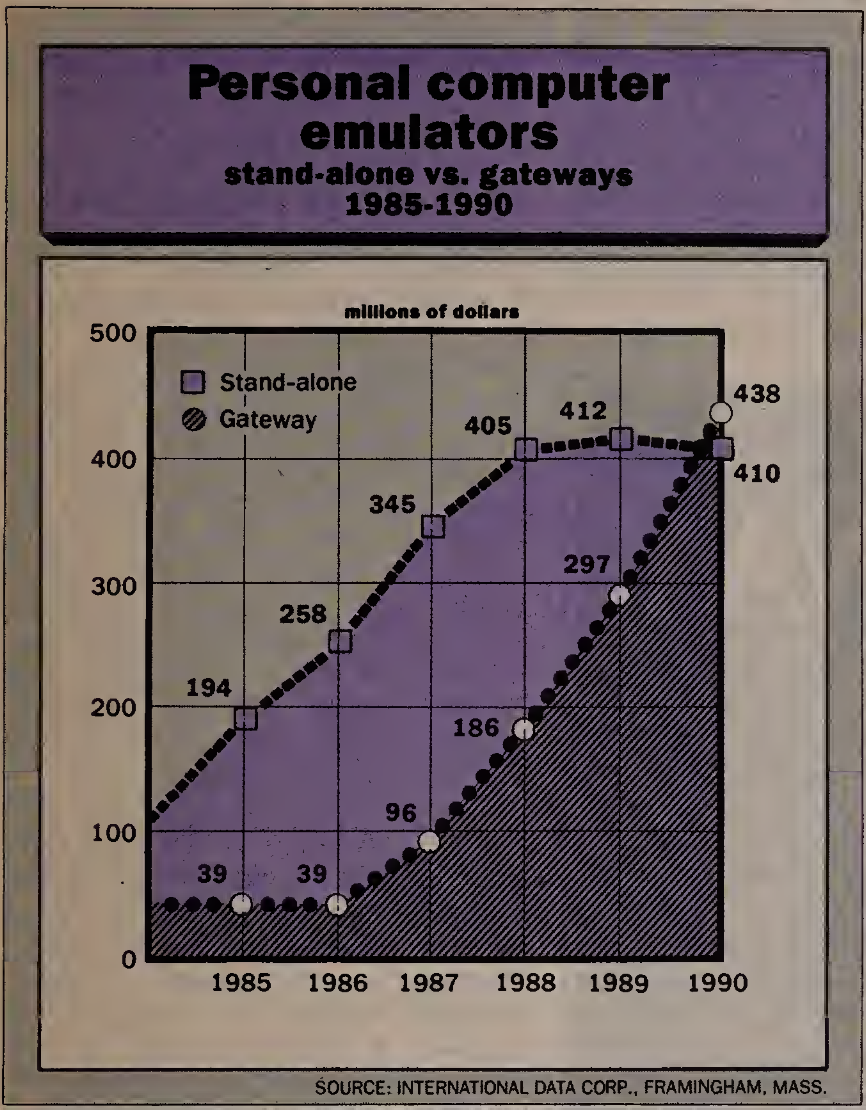
New Jersey Bell, with its Local Public Data Network, is still awaiting both FCC and state tariff approval. In October 1985, the FCC rejected New Jersey Bell's accounting plan but accepted a revised plan in December. The tariff is the only unresolved issue.

New York Telephone's Infopath protocol conversion service is unique among BOC offerings in that it will transmit both voice and data over voice grade lines. GTE Telenet Communications Corp., Tymnet/McDonnell Douglas Network Systems, Inc. and IBM have challenged New York Telephone's filing because "data over voice complicates the issue of equal access due to some very complex technological considerations," according to Gene Dougherty of the FCC's Accounting and Audits Division.

GTE Telenet and Tymnet have also challenged BellSouth's service and have asked the FCC to reconsider its approval. ◘

DATA DELIVERY

> “IBM speaking out against Open Systems Interconnect would be like you or I speaking out against motherhood. Of course, IBM will say it plans to support open systems, but the support will be very limited. For example, it may use OSI for specific types of applications. However, the principal way IBM will incorporate OSI is through SNA gateways.
>
> **Wushow Chou**
> professor
> North Carolina State University
> Raleigh, N.C.



Personal computer emulators
stand-alone vs. gateways
1985-1990

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

▶COMMUNICATIONS SOFTWARE

Free software lures astute users

Discounted and donated, it’s a users’ mecca.

BY NADINE WANDZILAK
Staff Writer

Good communications software is available at a very good price — little or no cost — and is as close as an electronic bulletin board or software library. And contrary to the first commandment of commercial software, copying this software is not only legal, it is actively encouraged.

Public domain software and its close relative, user-supported software, offer valuable and sometimes superior alternatives to commercial communications packages, according to corporate user Jerry Sanders. Sanders is chief of the technical support branch of the Center for Disease Control in Atlanta. He said his organization routinely uses public domain and user-supported communications programs. In addition, Sanders has implemented and now runs several bulletin board systems from which users at the Center for Disease Control can download communications packages.

Software in the public domain is software written and contributed to the public to copy and use freely. User-supported software is also held out to the public but it includes a request for a contribution to the program’s author. Requested contributions range from $5 to $90, but average $25. The late Andrew Fluegelman, author of the widely used PC-Talk user-supported communications package, initiated the user-supported concept in the early 1980s and

See **Software** page 16

▶ABA CONFERENCE

Bank tools announced

Message system stands out.

BY JOHN DIX
Senior Editor

NEW ORLEANS — A voice messaging system capable of answering incoming phone calls at banks and a new network management system from Doelz Networks, Inc. were the highlights of the few product announcements made at the American Bankers Association conference held here this month.

Phoenix-based Syntellect, Inc. introduced Infobot, a voice messaging system that enables bank customers to access information such as account balances, available credit line and loan rates by calling in and using their touch-tone telephones to walk through a series of voice menus. The system interfaces directly to IBM 3274 display controllers and replaces traditional 3270 terminals and their operators.

Infobot can be configured to support from one to four incoming telephone line modules and is compatible with most telephone systems, the company claimed. Each line module has its own dedicated host

See **ABA** page 16

DATA DIALOGUE

DONALD CZUBEK

Snads’ future looks promising

Talk about Systems Network Architecture communications seems to focus on IBM’s Advanced Program-to-Program Communications (APPC). Certainly, APPC is important, but an equally important component of SNA is SNA Distribution Services (Snads).

An optional SNA component, Snads is designed for store-and-forward communications in IBM networks. IBM refers to this store-and-forward capability as asynchronous communications or delayed delivery. An SNA network without Snads is only capable of synchronous data delivery. This means that before any data can be transmitted between two network users, a complete end-to-end data path between the sender and the recipient must be active and available.

Synchronous communications is appropriate for real-time applications and inquiry/response systems, but the price that’s paid for quick response time is dedicated communications facilities.

In general, a network that supports store-and-forward delivery can optimize the use of network resources such as communications lines and network processors by deferring delivery until low-cost or underutilized resources become available. For example, telephone lines between a regional office and corporate headquarters may be fully utilized by voice traffic during normal business hours, but are virtually unused at night. An SNA network using Snads could queue messages and files that are not time critical for transmission at night when phone lines are idle.

It’s important to understand that Snads store-and-forward networking is not suitable for all applications. Applications that require real-time interaction across a communications network are usually not candidates for Snads because it introduces indefinite delays. Other types of applications that are not time critical, such as electronic mail and most file transfer operations, are ideal candidates for Snads networking. In fact, the primary use of Snads today is in IBM’s strategic office systems such as Disoss, System/36 and the System/38, which use Snads to deliver electronic mail.

The store-and-forward networking of Snads provides another important capability — the ability to perform end-to-end routing of data through multiple mainframes and departmental processors.

Without Snads, an SNA network is only capable of communicating between a single pair of logical units (LU) with possible routing through SNA hosts and communications controllers.

Snads uses its own routing scheme to move data along an end-to-end path that may include several SNA LU-to-LU sessions. Snads ties together multiple, independent SNA LU-to-LU sessions into a cohesive end-to-end routing network.

But there’s a price to be paid, Snads routing capability complicates network configuration and management. Each processor in a Snads network must have its own address for network routing purposes. This address is in addition to all of the standard SNA

See **Snads** page 16

Czubek is vice-president of Communications Solutions, Inc., a San Jose, Calif., consulting firm.

Snads from **page 15**

LU and Physical Unit names used for SNA routing. This means that a network administrator must manage another entire level of addresses and routes.

Snads is currently available or announced on the following IBM products: System/36, System/38, Series/1, 5520, 8100, and Disoss. Today Snads is used almost exclusively for distribution of electronic mail among these products.

In the future, Snads technology will be applied to a broader range of applications. The first product from IBM to use Snads for applications other than electronic mail is the System/38. Unlike the other IBM products that implement Snads, the System/38 is an open implementation. This means that Snads is a generalized store-and-forward communications facility available to all System/38 users.

The System/38 implementation of Snads is a look into the future of this technology. Over the next few years the use of Snads will expand from its current electronic mail application into a generalized store-and-forward delivery system. ◪

Software from **page 15**

coined the phrase "freeware" to describe it.

In this context, "free" is not necessarily synonomous with "shoddy." The user-supported Procomm and QModem communications programs offer windowed menus and more extensive file transfer protocols, and are more user friendly than most commercially available software programs, according to Sanders. "You don't need a purchase order," he added. "You can have the packages today, at the right price."

Many corporate personal computer users have come to the conclusion they do not have to pay commercial prices for their software, said Patrick Cox of the PC Software Interest Group (PC-SIG) in Sunnyvale, Calif. PC-SIG manages a library of more than 500 disks in the public domain for IBM Personal Computers and compatibles. Most programs are user-supported.

User-supported software is like viewer-supported television, according to Cox. "Some programs are superior to anything on commercial television. Others won't pay for themselves in the market of network prime time. But to survive, these programs have to work. Over time, they become refined."

Source Telecomputing Corp. in McLean, Va., offers its members a 500-program library of software for IBM Personal Computers and compatibles. More than half are in the public domain, according to system operator Mike Todd.

Generally, public domain and user-supported programs lack the product support that comes with commercial programs. PC-SIG, however, has a technical support staff and program reviewers who test public domain programs for bugs. Many user-supported programs include a contact telephone number, Cox noted. The contact between user-supported software authors and users, Cox said, makes users feel they are contributing directly to improving the product. When users contribute to user-supported programs through The Source, Todd said he registers them, putting them on the mailing list for program updates.

On the down side, users of public domain software assume some risk, Sanders said. Some publicly available packages are in fact so-called Trojan Horses, that is, programs designed to do damage to users' systems, usually by erasing information. A public domain "bomb squad" program can be used to guard against a Trojan Horse, Sanders explained, by preventing it from writing to the user's hard disk. To be safer, Sanders recommends that public domain programs be loaded on diskette, not

See **Software** page 17

ABA from **page 15**

and voice microprocessors. Failure of one module will not affect the others.

Device programming is done through CRT prompts and does not require host software modification. Messages are digitally recorded voice and can be transferred from one system to another using floppy disks. Infobot prices begin at $11,000 for a single-line system.

Doelz used the conference to introduce Excell, a network management system for its Esprit One and Elite One switches and concentrators. The net management tool reportedly enables customers to create and maintain a data base of network configuration parameters, gather statistics concerning usage for report generation and bypass failed computer nodes.

Excell is based on a Massachusetts Computer Corp. (Masscomp) MC5500 super microcomputer running Masscomp's real-time version of AT&T's Unix operating system. The system has a 71M-byte fixed disk, a 45M-byte 1/4-in. cartridge tape drive, and a 650K-byte floppy drive. Up to 8M bytes of main memory is supported.

Excell ranges in price from $70,000 to $85,000 and is available 90 days after receipt of order. ◪

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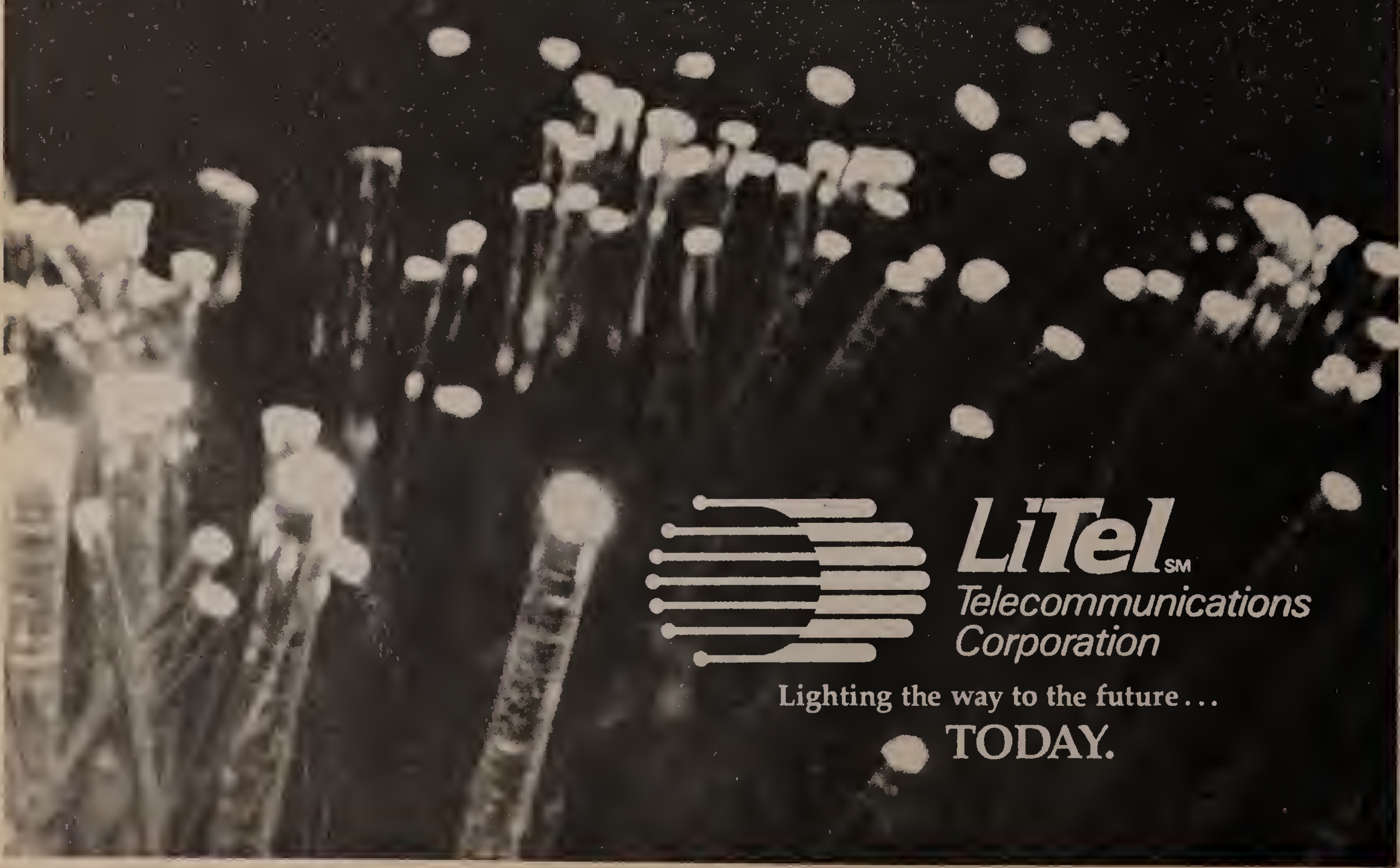

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Software from **page 16**

hard disk, and that the hard disk be temporarily write-protected.

Why do programmers contribute software to the public domain? Sanders, who contributed a program that reports on the usage of electronic bulletin boards, said, "It feels good to share it and show it off."

According to Cox, "Pride of authorship, and the desire to share knowledge and build a base for other users are still motives" for writing user-supported programs. But software writers now have financial incentives too. Some programmers use the bulletin board and library methods of distribution to circumvent the investment required to market and distribute a product on the open market.

Some software authors walk both sides of the street with user-supported and commercial versions of their programs, Cox said. He sees that as a sign of the success of the user-supported concept.

Sanders strongly recommends that users of user-supported public domain programs make a contribution to the authors. Fewer than 1% of users contribute, he said. Without users' financial support, "the user-supported arena will dry up," Sanders warned. "It's getting longer and longer between good packages. There used to be a really good package every week. Authors are justifiably disillusioned with users' greed."

Contacts

Sources and resources for public domain software:

Neal Prescott
Software Exchange Coordinator
IBM Users Group
c/o Boston Computer Society
1 Center Plaza
Boston, Mass. 02108
(617) 367-8080

New York IBM Personal
Computer Users Group
Gerard Plescia
Diskette Librarian
Suite 614
80 Wall St.
New York, N.Y. 10005
NYPC bulletin board: (212) 697-1809

PC Software Interest Group
(PC-SIG)
1030 D E. Duane
Sunnyvale, Calif. 94086
(408) 730-9291

The Source
Source Telecomputing Corp.
1616 Anderson Road
McLean, Va. 22102
800-336-3366

Capital PC User Group, Inc.
Public Domain Software
Library
P.O. Box 6128
Silver Spring, Md. 20906
bulletin board: (301) 949-8848

PRODUCTS & SERVICES

Gandalf Data, Inc. introduced three new modems that work with twisted-pair wiring and transmit asynchronous data at speeds up to 19.2K bit/sec at distances up to two miles.

The **LDS 2123** is an eight-port plug-in full-duplex modem module that interfaces with Gandalf's PACX 2000 distributed switching system. In point-to-point operation, it provides access to the PACX 2000 for up to eight half- or full-duplex operating local modems, including Gandalf's new LDS 120A and mLDS 123 models.

The LDS 2123 is priced at $1,100.

The stand-alone **LDS 120A** operates over four-wire lines in full-duplex mode or two-wire lines in half-duplex mode. At distances of 2½ miles, the modem supports transmission speeds up to 19.2K bit/sec and at five miles it can send data at speeds up to 9.6K bit/sec. It can support either point-to-point or multidrop operating modes and has local analog and digital loop-back testing capabilities.

The LDS 120A costs $300.

The **mLDS 123** plugs directly into data terminal equipment (DTE) and comes with either male or female connectors. The palm-sized unit is intended for point-to-point operation over unloaded four-wire lines in full-duplex and is powered by data and control signals from the DTE's RS-232-C or V.24 interface. It has a range of up to two miles.

The mLDS 123 lists for $105.

Gandalf Data Inc., 1020 South Noel Ave., Wheeling, Ill. 60090 (312) 541-6060.

Gandalf Data, Inc. released new software that expands the network interconnection capability and protocol support of its **Switchmux** statistical multiplexer and data switch.

The new software reportedly allows four Switchmuxes to be configured into a ring or string network capable of supporting up to 64 devices. Each Switchmux supports 16 subscribers, four of which may be using synchronous transmission.

The new release also allows the Switchmux to multiplex data from bit-oriented synchronous protocols, including IBM's Systems Network Architecture and X.25 packet assemblers/disassemblers in addition to supporting asynchronous protocols.

The new software is included in all Switchmuxes now being shipped.

A fully configured rack-mounted Switchmux network supporting 64 devices costs $20,600. The software to upgrade existing Switchmuxes costs $125.

Gandalf Data, Inc., 1020 South Noel Ave., Wheeling, Ill. 60090 (312) 541-6060.

Computer Peripheral Systems, Inc. introduced a pair of converter units that enable devices with RS-232 interfaces to access Burroughs Corp.'s Two-Wire Direct Interface (TDI) network.

The units convert RS-232 electrical signals to allow microcomputers and terminals operating with Burroughs to poll and select software to access a local host. The **T-2** two-port unit converts two RS-232 devices onto a single TDI line connection. The **T-4** four-port unit converts four RS-232 devices to one TDI line.

Both units use snap-in modular telephone type data cable to connect RS-232 devices to the converter. The T-4 can also use RS-232 round cable to connect RS-232 devices to the unit.

The T-2 costs $225, and the T-4 lists for $325.

Computer Peripheral Systems, Inc., P.O. Box 98282, Atlanta, Ga. 30359 (404) 292-9565.

Hewlett-Packard Co. announced three new products that add X.21 protocol analysis to its HP 4951A and HP 4953A protocol analyzers.

The **HP 18198A X.21 State Simulator Interface** supplies the HP 4953A with an X.21 environment. The HP 18198A allows users to program the HP 4953A to proceed through and display data in each X.21 state as specified by Consultative Committee on International Telephone and Telegraph standards. It also allows the HP 4953A to log events and store precise timing information during that process automatically.

The HP 18198A, including an X.21 interface pod, costs $7,000.

The **HP 18154A X.21 Interface Kit** is used with the HP 4953A to monitor, simulate and analyze 64K bit/sec switched-circut X.21 data traffic between data terminal equipment and data circut terminating equipment.

The HP 18154A automatically switches between call establishment and data transfer protocols; between Ascii, Ebcdic and hexadecimal data codes during monitoring; and between simulate and postprocessing modes. With the HP 18154A, users can see glitches occurring on the line during Level 1 analysis.

The HP 18154A X.21 Interface Kit, including an X.21 connecting cable, is priced at $1,250. It requires the use of an HP 18136A RS-449 Interface Pod, which costs $950.

The **HP 18178A X.21 Interface Kit** and HP 18197A X.21 and RS-232-C/V.34 Interface Pod work with the portable HP 4951A protocol analyzer in order to isolate and identify problem devices transmitting at 19.2K bit/sec or below. With the new X.21 interfaces, the HP 4951A simulates suspected devices and monitors and tracks system performance by measuring call establishment and call clear time parameters.

The HP 18178A X.21 Interface Kit, including a connection cable, costs $750.

The required HP 18197A X.21 and RS-232-C/V.34 Interface Pod is priced at $1,150.

Each of the new X.21 products includes application software that loads from tape onto either the HP 4953A or HP 4951A proctocol analyzers.

Hewlett-Packard Co., 8020 Foothills, Roseville, Calif. 95678.

Universal Data Systems, Inc., a division of Motorola, Inc., introduced two modems, a multiplexer and a protocol adapter.

The **Sync-Up 201C** operates at speeds up to 2,400 bit/sec and **Sync-Up 208A/B** works at speeds up to 4.8K bit/sec. The automatic dialing modems are compatible

See **UDS** page 18

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PRODUCTS & SERVICES

UDS from **page 17**

with the company's stand-alone models. Designed for micro-to-mainframe terminal emulation, both card-based modems operate in half-duplex mode and support synchronous transmissions over a dial-up telephone network.

The products come with either Sync-Up Dial communications software or Sync-Up Binary Synchronous Communications (BSC) software, an IBM 2780/3780 or 3270 series terminal emulation package.

The Sync-Up 201C with Sync-Up Dial software costs $685; with Sync-Up BSC software it costs $895. The Sync-Up 208A/B with Sync-Up Dial software costs $1,200; with Sync-Up BSC software it costs $1,410.

The 3270A protocol adapter reportedly enables an asynchronous Ascii terminal to act like an IBM 3270 controller and communicate with a remote host running IBM's BSC protocol.

The 3270A protocol adapter lists for $695.

The TDM-56 six-channel time division multiplexer supports an aggregate speed of 56K bit/sec on a digital data service network.

The device reportedly supports asynchronous and synchronous channels at speeds ranging from 2,400 bit/sec to 19.2K bit/sec.

The TDM-56 lists for $1,995.

Universal Data Systems, Inc., 5000 Bradford Drive, Huntsville, Ala. 35805-1953 (205) 837-8100.

Communications Solutions, Inc. introduced software that supports access for non-IBM devices to IBM's Disoss, a mainframe document storage and retrieval package.

Disoss/Talk enables users to distribute documents to multiple recipients, retrieve documents sent by others and search libraries to retrieve selected files.

The Disoss/Talk package requires Communications Solutions' IBM Document Interchange Architecture (DIA) emulation package, Access/DIA.

Disoss/Talk reportedly features single function-key activation of DIA commands, provides defaults for command arguments and has a screen-oriented field editing mode.

The software runs a variety of computer systems, including those that support Unix and Microsoft Corp.'s MS-DOS operating systems.

When bought with Access/DIA, the Disoss/Talk software has a one-time fee of $10,000.

Access/DIA has a royalty fee of $200 for each device connected to it.

Communications Solutions, Inc., 992 S. Saratoga-Sunnyvale Road, San Jose, Calif. 95129 (408) 725-1568.

Micom Systems, Inc. introduced a line of digital transceiver products that access AT&T's Dataphone Digital Service (DDS) and two protocol converters that link Ascii devices to IBM hosts.

The **Micro4900** family of digital transceivers combines data service and channel service units into an integrated service unit (ISU) that supports access to DDS.

The Micro4900 ISU models come in stand-alone or card module rack-mounted versions and support synchronous lines in point-to-point or multipoint applications. The Micro4900 ISU models automatically adapt to DDS standard link speeds of 2,400 bit/sec, 4.8K bit/sec and 9.6K bit/sec.

Micro4900 ISU+ units also offer unattended remote diagnostics, an asynchronous-to-synchronous converter and an external clock buffer that synchronizes the tail circuits to the master DDS clock.

A stand-alone Model4950/ISU costs $695, and the Model4950/ISU+ is priced at $725. The card module Model4350/ISU lists for $645. The card module Model4350/ISU+ costs $675.

The **Micro7881** protocol converter enables asynchronous terminals and personal computers to mimic IBM 3278 display stations.

The converter's two RS-232 interfaces support connection and signal routing from the terminal or personal computer to the controller and another asynchronous device.

Security features of the Micro7881 include password protection, inactivity time-outs and buffer flushing to the host when dial-up lines disconnect.

The **Micro7887** protocol converter allows Ascii printers with Centronics parallel or RS-232 serial interfaces to imitate IBM 3287 printers.

The Micro7887 features a transparent mode that supports Systems Network Architecture character string data streams.

A Micro7881 costs $1,095. A Micro7887 lists for $1,495.

Micom Systems, Inc., 4100 Los Angeles Ave., P.O. Box 8100, Simi Valley, Calif. 93062-8100 (800) 642-6687.

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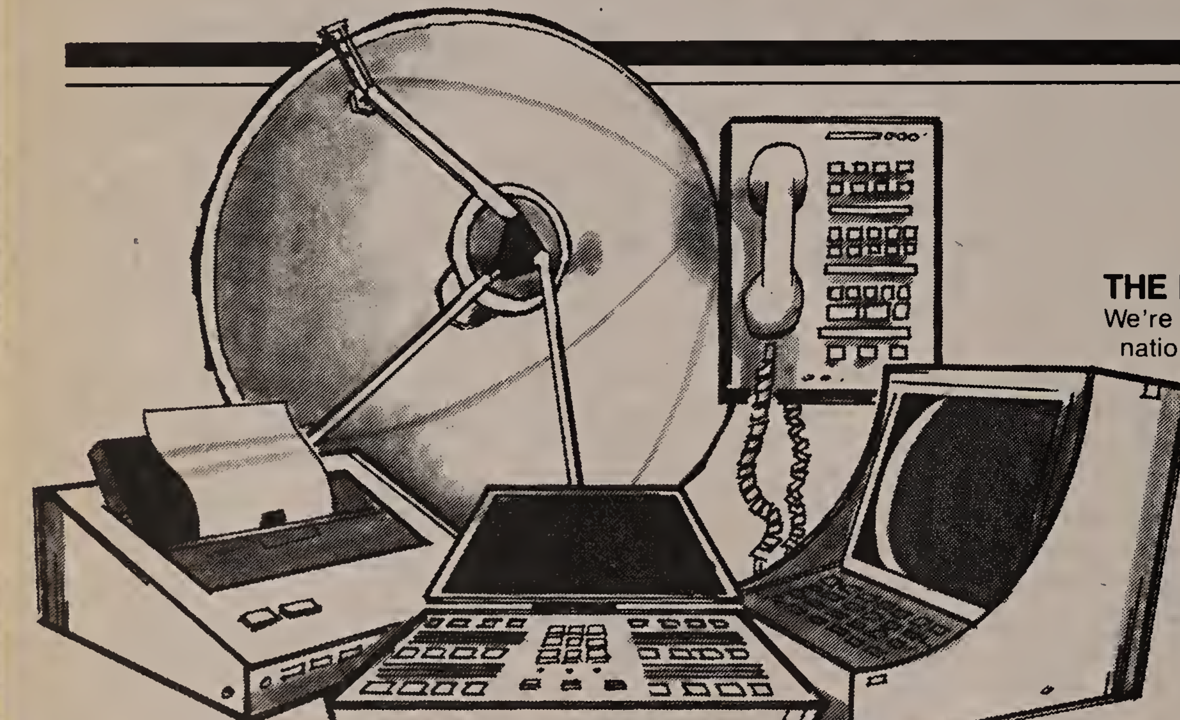

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> “[The Corporation for Open Systems] is neutral. COS is not a standards-making body. We intend to facilitate the development of standards. Our objective is to accelerate the introduction of interoperable products.
>
> **Lincoln Faurer**
> COS president

▶ MANUFACTURING NETS

GM details MAP project

Official discloses plans for Truck and Bus plant factory net scheme.

BY BOB WALLACE
Senior Writer

SEATTLE — General Motors Corp. has released details of its three-plant Truck and Bus Group Manufacturing Automation Protocol-based factory networking project — one the automaker claims involves the first production implementation of Version 2.1 of the evolving standard.

At the recent MAP/Technical and Office Protocol users group meeting here, a GM official described the MAP-based factory-wide nets that have been installed at the three plants. The expensive and ambitious undertaking, which involves equipment from a variety of manufacturing systems vendors, underscores GM’s commitment to installing MAP technologies in its production facilities.

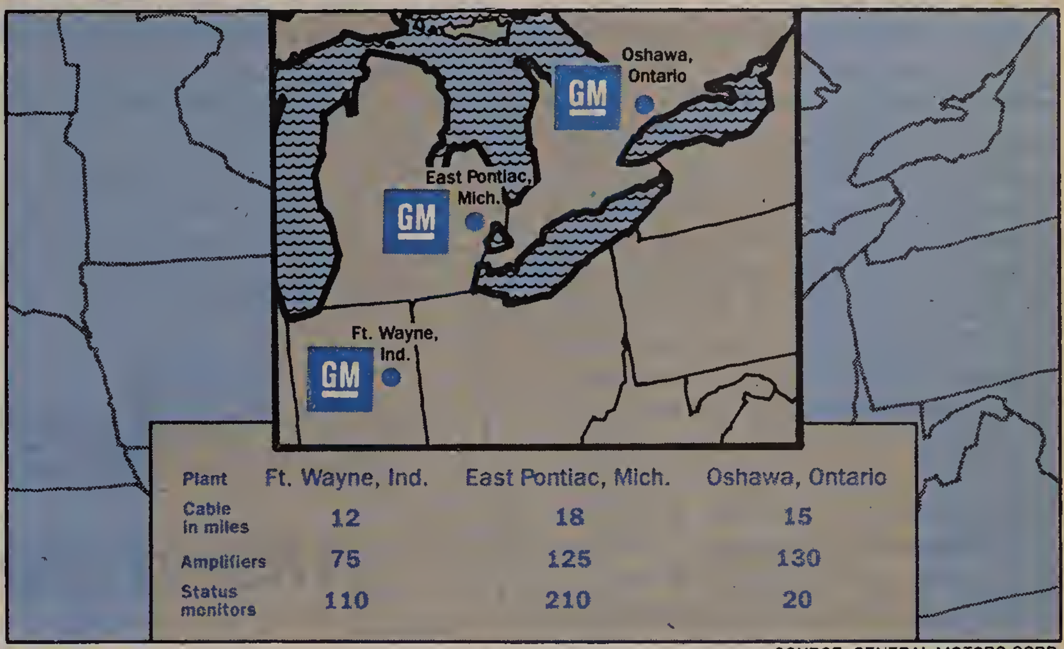
The truck and bus assembly plants, which are expected to be in full operation by October, are located in East Pontiac, Mich., Fort Wayne, Ind., and Oshawa, Ontario. Although the automaker would not divulge cost information for the gargantuan factory networking project, the broadband, coaxial cable-based local-area network installation costs for the East Pontiac facility alone will exceed $1.5 million.

In a dramatic move aimed at accelerating and facilitating the installation of MAP networks, the East Pontiac and Oshawa plants were closed last year and their interiors completely gutted. The recently constructed Fort Wayne plant was designed to accommodate a MAP-based backbone local-area network. Although the three plants boast a cornucopia of state-of-the-art factory technologies, the TOP specification was not used to support the plants’ administrative and engineering offices.

MAP is a set of evolving and es-

See **Installation** page 20

General Motors Corp.’s GMT 400 project



Plant	Ft. Wayne, Ind.	East Pontiac, Mich.	Oshawa, Ontario
Cable in miles	12	18	15
Amplifiers	75	125	130
Status monitors	110	210	20

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BOB WALLACE

Directory will help users withstand marketing blitzkrieg

The Manufacturing Automation Protocol/Technical and Office Protocol Product Directory should partially eliminate confusion as to which vendors offer products designed to be compatible with the two communications specifications [see “User guide set to bow,” *Network World*, May 19].

This effort is long overdue. Prior to the recent MAP/TOP users group meeting, equipment vendors had overrun many users with product marketing blitzkriegs. These often erroneous claims about products’ capabilities have served only to confuse users. As one such user stated at the recent meeting, “There are users here who only know that MAP is spelled M-A-P.”

Although making this directory available to users group members is a big step in the right direction, much more needs to be done to assist factory networkers in selecting products to be used in MAP and TOP networks.

Users should be cautioned not to forget that the MAP/TOP Product Directory is a compilation of product information submitted by equipment vendors. The directory provides users with a wealth of information on hardware and software that is supposedly compatible with MAP or TOP specifications. But results of conformance tests that determine MAP and TOP compatibility are not available for any of the 27 products listed in the sample issue.

The directory has another shortcoming. It lists products, but it does not compare them to one another. Since a standard for carrier-band subnetworks has not been incorporated into the MAP standard, there are no carrier-band products listed in the directory.

The product directory was very well received by attendees at the users group meeting in Seattle. All users questioned about the survey said they plan to purchase the directory. William Geibel, a staff electrical engineer with Kaiser Aluminum and Chemical Corp., said he would likely purchase it.

“The survey provides information needed for surveying the MAP product market,” he explained. “However, I would like to see [the directory] list information on which products interoperate with one another,” he added.

W.J. Collum of AT&T in Morristown, N.J., said he too planned to purchase the directory. “This directory is absolutely necessary,” he maintained. “It will help eliminate confusion as to what capabilities MAP products really have.”

The Society of Manufacturing Engineers and the Industrial Technology Institute of Ann Arbor, Mich., should be applauded for producing this product listing. But because the product data was submitted by vendors and is extremely difficult to validate, users should treat the survey only as a reference aid.

INCIDENTALS

This month’s fast-comer award goes to Retix, a Santa Monica, Calif.-based company that has already inked pacts to sell its Manufacturing Automation Protocol Version 2.1-compatible software to the likes of Prime Computer, Inc. and Advanced Computer Communications Co. The Retix software will be used with Advanced Computer’s soon-to-be-released Digital Equipment Corp. VAX-compatible communications interfaces.

The Retix software runs under Berkeley Unix and DEC Ultrix operating systems. Retix will also supply Prime with MAP software for its 50 series of superminicomputers. Retix also peddles personal computer cards for AT&T Information Systems’ Starlan local-area network. Charles Fogg, technology marketing vice-president, claims the company will soon announce an agreement with a computer manufacturer larger than Prime.

Prime announced its intent to develop products for use in MAP and Technical and Office Protocol nets. The as yet unreleased Prime products will reportedly incorporate Layers 2 through 7 of TOP Version 1.0. Prime’s planned MAP products will incorporate Layers 1 through 4 of MAP Version 2.1.

Charles River Data Systems, Inc.

See **Incidentals** page 21

Installation from **page 19**

tablished standards designed to allow factory equipment made by a variety of vendors to communicate over a single network. TOP is a similar set of established and evolving standards designed to allow office equipment to communicate over a single network.

The GM MAP plants are outfitted with Industrial Networking, Inc.'s (INI) MAP-compatible MAP/One broadband local-area network. The MAP/One networks operate at 10M bit/sec but are not connected to the Ungermann-Bass, Inc. Net/One broadband nets, although they operate on the same coaxial cable. Hewlett-Packard Co.'s HP 1000 Cell Controllers and DEC VAX Area Managers are widely used in the three MAP networks. Robots for the three plants were provided by GMF Robotics, Inc. and Cincinnati Milacron Marketing Co. The robots are equipped with INI MAP boards, which allow them to communicate with the backbone MAP network. Both Allen-Bradley Co. and Simpact Associates, Inc. also provided equipment used in the project.

GM would not divulge additional information on the networks. A formal project introduction is tentatively slated for July.

J.M. Rathsburg, a superintendent with GM Truck and Bus Group's manufacturing planning and computer-aided design and manufacturing division, claimed GM will save roughly $500,000 by using MAP-based systems as opposed to proprietary equipment in implementing the factorywide nets. "In a non-MAP installation, the per-device connection cost can run from $10,000 to $14,000," he asserted. "In a MAP environment, the per-device connection cost ranges from $7,000 to $10,000." Rathsburg said GM expected to save $3,000 to $4,000 per network connection.

> *"GM will save roughly $500,000 by using MAP-based systems as opposed to proprietary equipment."*

Rathsburg said the three assembly plants boast extensive automation in the body and paint shops, the cab and engine trailer and the frame and final assembly areas. The three plants will make extensive use of both robotics and automated guided vehicle (AGV) technology. Factory floor robots have been fitted with vision systems that will guide them in their efforts. AGVs will be used to deliver material from parts racks to assembly areas, as well as to trim and assemble automobile parts, he explained.

Although Rathsburg said the three plants use MAP to support communications between devices on the factory floor, the plants' computer centers feature IBM processors under Systems Network Architecture and Digital Equipment Corp. hosts linked through DECNet. "Since we took the [MAP] 2.1 specification right from the printer and handed it to our vendors, there were some vendors that couldn't work within our time frame," Rathsburg noted. "As a result of this, not all our applications use MAP."

Redundancy has been designed into the assembly plants' MAP networks. According to Rathsburg, every other column in the factory is connected to a second coaxial cable trunk. A network tap is installed on every column in the three plants. "If a torch should happen to accidently sever one of the coaxial cables, we can switch to the other [network trunk] at the head-end [remodulator] and still maintain our communications capabilitity," he explained.

Because the Truck and Bus project is to be GM's first production implementation of MAP 2.1, planning the three networks caused some headaches. "We had to work with vendors to help them develop MAP products," Rathsburg ex-

> *"The three plants will make extensive use of both robotics and automated guided vehicle (AGV) technology."*

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Keynote Speaker:
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Director of Standards
Practices, IBM Corp.

Featured Session:
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Will Zachmann
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Industry experts will instruct full-day courses on network control, IBM/SNA network management systems, strategic planning and network diagnostics.

Monday, June 9, 1986

9:00 am - 5:00 pm
Select One

T-1 **Fundamentals of Network Control**
Gabriel Kasperek, President, Kazcom, Inc.
The basics of network control, including problem diagnosis and repair, maintenance and operational issues.

T-2 **Integrated Voice/Data Corporate Networks**
Roshan Lal Sharma, Sr. Scientist/Consultant, Telecommunications Network Science.
Network topologies and their synthesis, cost-effective network planning, future trends in intelligent networks and their impact on network management and control.

T-3 **Cost Efficient Methods for Implementing New Tariffs**
Cheryl A. Cushing, Manager, Reference Services, Connections Telecommunications, Inc.
Post-divestiture tariff rules, including LATAs and POPs with a comparison of major common-carrier tariffs, and evaluation of intra-LATA access alternatives and a review of new regulatory alternatives to traditional network costs.

T-4 **ISDN I**
Samuel Lynch, Senior Consultant, Zatyko Associates.
Definition and concepts, application standards and world-wide status, plus comparison of ISDN against OSI Reference Model as standard.

T-5 **System Network Architecture I**
Thomas Routt, Senior Consultant, Zatyko Associates.
Current status of IBM's communication architecture, new extensions such as LU 6.2/APPC and NETBIOS and IBM LANs as "defacto" standards.

plained. He said the network planners worked with GM's Electronic Data Systems Corp. subsidiary to develop test facilities for factory equipment.

The Truck and Bus Group veteran said the use of several types of factory automation equipment has grown at a fast pace since 1983. Over this period, Rathsburg said, the number of programmable controllers has risen from an average of three per plant to 350 per plant. The use of robots has skyrocketed from two per plant in 1983 to roughly 180 per plant now. The implementation of machine vision and AGV systems has also risen sharply, Rathsburg contended.

A MAP system will also have far fewer potential points for the failure of the communications link, Rathsburg argued. There are 19 points where a message sent over a non-MAP network could be damaged or lost, while there are only five such potential problem spots on a MAP network, he said.

The ease of use of a broadband, coaxial cable-based local-area net in GM's van production facility in Baltimore helped advance the case for distributing broadband coaxial cable in the three plants. According to GM's local net wiring plans, factory floor devices will all be within a short distance of the network. "No longer will it be necessary to string telephone wire or pull coaxial cable the length of the plant just to connect a terminal to the network," Rathsburg said.▣

Incidentals from **page 19**

announced Universenet Release 3.0 at the recent MAP users group assemblage. This MAP/TOP-compatible software will be available in July for $1,500. For those users who want to look before they leap, the documentation for the package costs $100.

Data General Corp. threw its hat into the MAP/TOP ring at the recent MAP/TOP users group meeting in Seattle. Data General spokesman Bruce Bendix said the company will announce products compatible with MAP and TOP in early 1987.

Apollo Computer, Inc. recently announced that General Electric Co.'s Calma subsidiary renewed its OEM contract with Apollo — a pact estimated in excess of $25 million. The contract calls for initial purchases by Calma of Apollo's workstations, including the Domain Series 3000 Personal Workstation and the DN570A high-end graphics workstation. Calma is also reportedly evaluating the Apollo DN580 color graphics workstation for inclusion in its product line.

General Electric Co.'s Silicon Systems Technology Department and Megatek Corp.'s Template Division have joined forces to develop a software device interface that will allow Template's graphics software package to run on GE's Graphicon 700 3-D graphics processor. Under the agreement, GE will help Template develop the interface. Once it is developed, users of the Graphicon 700 processor will be able to run Template applications immediately without having to develop custom interfaces.

Litton Industrial Automation Systems Group recently broke ground for an 85,000 square-foot systems engineering facility to be located in Hebron, Ky. The facility will serve as Litton's center for the development and implementation of computer-integrated manufacturing applications. The building will house 8,000 square feet of labs that will be used to set up and integrate robotic work cells, vision systems, test equipment, controls and software systems.

Concord Data Systems, Inc. recently introduced a National Electrical Manufacturing Association (Nema) Type 12 Industrial Enclosure for its MAP communications equipment. The Nema 12 rating specifies protection against fibers, dust, dirt and drippings found in harsh factory environments. The enclosure replaces the standard Token/Net Interface Module chassis and holds as many as five circuit cards on a removable door. The enclosure may be ordered with any Token/Net Interface Module. The standard version of the enclosure, which uses a conduit connector, is wall-mounted, supports external operating temperatures up to 40 degrees Celsius and costs $1,500.

Hewlett-Packard Co. and Denniston and Denniston, Inc. of Arlington Heights, Ill., have entered an agreement that will allow HP to sell D&D's Starnet software package for work cell control applications. Starnet, designed for use in computer-integrated manufacturing applications, can be used with either supervisory control/area management systems or with work cell-control computers.

Starnet reportedly enables users to monitor production activities and capture production data, archive historical data in a variety of formats and generate reports to document the production process. Starnet uses HP systems such as the Image/1000 data base management software, DGL/1000 graphics and PCIF/1000 links to intelligent factory floor devices. Starnet costs $50,000.▣

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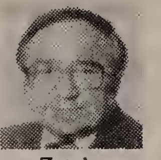
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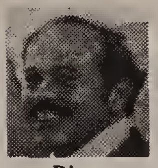
Rhue

T-6 Public/Private Data Network I
Daniel Zatyko, President, Zatyko Associates.
Current status of IBM's communication architecture, including applications and standards, and development of X.25 up to 1988 CCITT adoption.

T-7 MAP/TOP Systems Interconnection I
Donald Harring, Vice President, Zatyko Associates.
Status of seven layer OSI Reference Model as framework for future network compatibility, review of major vendor architecture - IBM, DEC, etc; migration to manufacturing automation and office communication protocols.

Tuesday, June 10, 1986

9:00 am - 5:00 pm
Select One

T-8 Planning the Network Control Center
Gabriel Kasperek, President, Kazcom, Inc.
User considerations in the design, equipment selection, software, and instrumentation of a network control center and related vendor issues.

T-9 Problem Resolution and Network Management in SNA Networks
Fred Cook, Senior Consultant Kaptronix.
Techniques useful in analyzing problems in SNA networks. Topics include detailed SNA sequences, VTAM trace, NCCF, NPDA, NLDM and a review of critical parameters in NCP System Generation.

T-10 Network Modeling/ Design Workshop
Larry Rhue, Vice President, Connections Telecommunications Inc.
Network design calculations using MNDS PC-based design software and the complimentary Borland SIDEKICK package. Also included, queuing calculations in simple and complex network models, reflecting SDLC, BSC and X.25 protocols, statistical multiplexers and distributed concentrator networks.

T-11 ISDN II
Samuel Lynch, Senior Consultant, Zatyko Associates.
Technology and system/network/switching of ISDN, and certification and network testing, including 1986/87 field trials/user implementation.

T-12 System Network Architecture II
Thomas Routt, Senior Consultant, Zatyko Associates.
Technology and systems impact of SNA and relation to open architectures and protocols on networks from DEC and other vendors, and higher layer SNA services - DIA/DCA, PU 2.1, etc.

T-13 Public/Private Data Network II
Daniel Zatyko, President, Zatyko Associates.
Technology and systems impact of long distance, regional and in-house data networks, including message handling systems and office document interchange formats under different operating systems.

T-14 MAP/TOP Systems Interconnection II
Donald Harring, Vice President, Zatyko Associates.
Session will cover MAP/TOP common protocol connectivity, GM and Boeing programs, other vendor demos, user experiences and the implications of Corporation for Open Systems on MAP/TOP, vendor standards and products.

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▶ INTERFACE BOARD

Simpact link debuts

VAX gateway offers ties to MAP LANs.

BY JIM BROWN
New Products Editor

Simpact Associates, Inc. released a gateway reportedly giving Digital Equipment Corp.'s family of VAX computers access to local-area networks that support the interim network interface units of the Manufacturing Automation Protocol Version 2.1.

The Communications Protocol Interface was designed to allow VAX resident data to control such factory automation devices as programmable controllers, cell controllers and factory floor terminals. The system consists of a Simpact interface board, called an Intelligent Communications Processor (ICP), which plugs into the backplane of a VAX running under VMS, RSX-11M, RSX-1M Plus or MicroVMS operating systems and transfers data to the MAP local-area network through a network interface unit.

The ICP uses a DEC Micro/T-11 microprocessor and comes in versions compatible with Q-bus, Unibus or VAXBI bus equipped VAX computers.

The ICP is reportedly compatible with the 10M bit/sec MAP token bus Network Interface Unit and supports host data transfer in full duplex at 230K bit/sec. ICP Network Interface Unit connection is made over cable that is outfitted with a RS-449/422 37-pin connector.

The price for a VAX Unibus ICP is $7,400, and the cost for a VAX Q-bus connection is $4,900. Both Unibus and Q-bus ICPs are currently available. Pricing and availability for the VAXBI bus will be announced in September.

Simpact Associates, Inc., 9210 Sky Park Court, San Diego, Calif. 92123 (619) 565-1865.

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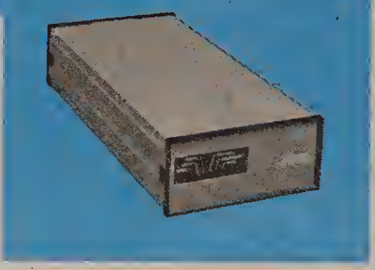

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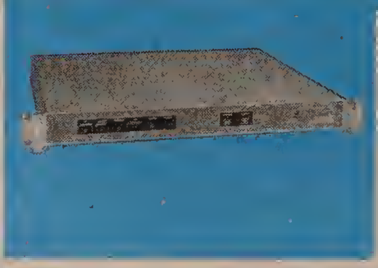

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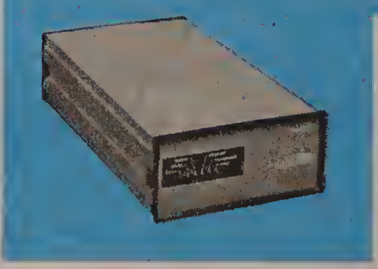

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▶ CELL CONTROLLER

H-P line burgeons

A-series expands.

BY JIM BROWN
New Products Editor

Hewlett-Packard Co. added an entry-level work cell controller equipped with an A600+ processor to its family of A-series factory automation real-time computers.

The new .4 million-instruction-per-second Micro 16 replaces the Micro 26 at the low end of HP's factory automation systems. With HP or HP-compatible software, the Micro 16 talks to control robots, programmable logic controllers, barcode readers, automatic storage and retrieval systems, vision sytems and machine tools.

The unit is open to a number of industry standard protocols, including parallel, RS-232-C, X.25, IBM protocols and IEEE standards 488 and 802.3. A 4.3M bit/sec I/O bandwidth allows the Micro 16 to collect and control information from a variety of sources concurrently and coordinate output with other computers in the plant.

The Micro 16 computer is 37% smaller than its predecessor, the Micro 26. The cell controller is is often use to collect data from, and manage communications with, such factory floor devices as barcode readers, programmable controllers, and machine tools.

A Micro 16 system that includes a central processing unit with 1M byte of memory, an IEEE 488 interface, a 40M-byte disk, tape backup, a terminal, a cabinet, an RTE-A operating system and a programmable contoller interface is listing for $19,940.

Hewlett-Packard Co., 1820 Embarcadero Road, Palo Alto, Calif. 94303.

▶ FACTORY MICRO

Cromemco micro bows

Cromemco, Inc. announced a ruggedized computer designed for use in industrial automation and process control applications.

The CS200 uses AT&T's Unix System V operating system and comes equipped with a heavy-duty power supply and a metal chassis, according to a spokesman for the vendor. The unit's central processor is the Motorola, Inc. MC68010.

The CS200 can reportedly be equipped with up to 16M bytes of memory.

The CS200 ranges in price from $11,000 to $18,000, depending upon configuration.

Cromemco, Inc., 280 Bernardo Ave., Box 7400, Mountain View, Calif. 94039 (415) 964-7400.

COMMUNICATIONS MANAGER

Salary survey

Communications managers and recruitment professionals contacted during an informal survey conducted recently by *Network World* said job applicants with a few years of communications-related experience can easily command salaries in the $30,000 to $45,000 range.

▶ HIRING

Telecom careers command top cash

The qualified also race on the corporate fast track.

BY MICHAEL FAHEY
Staff Writer

It continues to be a seller's market for telecommunications and networking professionals. Communications managers and recruitment professionals contacted during an informal survey conducted recently by *Network World* said job applicants with a few years of communications-related experience can easily command salaries in the $30,000 to $45,000 range.

"With three or four years' experience, telecommunications people with technical or engineering skills are making salaries in the mid-40s," said Jerry Pagano, executive recruiter for telecommunications at Fortune Communications in Nashua, N.H. Pagano specializes in recruiting telecommunications personnel for businesses throughout the country.

"It is a stronger job market than data processing," Pagano said. "A qualified person in communications will get four or five job offers, while an equally qualified DP person will get one or two job offers."

In addition to the ample variety of jobs available to them, telecommunications and networking personnel can also move quickly onto the corporate fast track.

According to Pagano, telecommunications professionals at Big Eight accounting firms can more quickly and easily become partners in those companies than their coworkers who have accounting and management backgrounds.

Businesses located in large urban areas continue to have less difficulty finding telecommunications professionals, primarily because the companies benefit from a larger pool of qualified applicants from which to select. Generally, those businesses also pay higher salaries than companies in rural locations.

Gil Smith, a data processing recruiter for the Manhattan-based Dean Witter Reynolds, Inc., said his company's location and the high salaries it offers have helped the company in hiring telecommunications applicants.

Smith said he has hired several communications professionals in the past two years. He declined to reveal specific salary figures, but said senior voice and data professionals could expect to earn in the

See **Hiring** page 26

GUIDELINES
ERIC SCHMALL

Self-diagnosis induces headaches

Like pharmacists in the neighborhood apothecary, many communications managers dispense equipment to customers without realizing that those users are like patients who write their own prescriptions.

Users often indulge in self-diagnosis for their communications needs and then become addicted to certain cures. The most irresponsible action the communications department can take is to give in to the user in this regard.

Users have the best perspective on their needs in the same way that only a patient can describe symptoms to a physician. However, only an irresponsible doctor would allow the patient to self-medicate. The needs of the patient and the user have to be assessed properly by a professional who can recognize the deeper aspects of the request and can best match the cause and the cure.

Responsible management in communications, therefore, does not simply acquiesce in user demands for adding "another 10 terminals" or "another drop on a leased line" without subjecting the request to examination.

Beneath each petition is an need for connectivity to accomplish certain tasks. There are dimensions to be discovered and measured. Volumes of data, lengths of time, distances between sources and sinks, speeds of access and the access media are all components of the calculations to be addressed.

By ferreting out this information and tailoring the solutions to corporate resources, the prudent manager will be able to supply the most cost-effective communications system solutions. This analysis is impossible unless there is a well-developed decision tree, which logically divides the process of requirement assessment into a set of branching decision points.

Building such a conceptual framework forces the manager to establish a hierarchy of communications questions, which will typically include such topics as I/O volumes, device alternatives, access methods and connection alternatives. Answers to these questions can lead to a proper assignment of communications solutions.

Users should not balk at such scrutiny of their needs. In fact, they may take comfort in the fact that someone cares enough to tailor a solution that fits their needs and probably costs less than anticipated. It isn't difficult to wean customers from old technology in this industry. They just need a guide.

The communications manager has evolved quickly from artisan to master builder. The architect cannot design a building without some sense of dimension or intent. In the same manner, the communications professional must realize that the task at hand is not to lay stone upon stone — the charge is to build a cathedral.

Schmall is network systems manager for an insurance holding company.

PEOPLE

William Adams was appointed vice-president and general manager of Harris Corp.'s Digital Telephone Systems division. Adams joined Harris in 1984 as vice-president and general manager of the Mobile Telephone division. He succeeds **Donald Green,** who will provide consultant services to the company.

Robert Bressler has joined 3Com Corp. as vice-president and general manager of the Application Software Division. Bressler moved to 3Com from Bolt, Beranek and Newman, Inc.

C-COR Electronics, Inc. has named **Jack Andrews** treasurer and vice-president of finance, and **Mark Robertson** vice-president of operations and manufacturing. Andrews moved to C-COR from Bendix Corp., which was recently renamed Allied-Signal Corp. He succeeds **J. Joseph Howe Sr.,** who has retired.

Northern Telecom, Inc. has made three executive appointments at its Integrated Networks Systems operating unit based in Research Triangle Park, N.C. **Peter Worsley** is vice-president of switching. **David Wagers** succeeds Worsley as vice-president of transmission. **Hans Bolli** succeeds Wagers as vice-president of the southern region.

Ed Basquill was appointed president of Telecom Plus Shared Tenant Services, Inc., in addition to his present responsibilities as president of Telecom Plus Software Systems.

Gregory Voros was named president of Fujitsu Imaging Systems of America, Inc.

Michael Campbell was named president of American Satellite Co.'s Government Systems Division, and **William Turnbull Jr.** has assumed the new position of vice-president for finance in that division.

Jack Blumenstein was appointed vice-president of Rolm Corp.'s Business Communications Group.

James Barksdale has joined the board of directors of Bridge Communications, Inc. Barksdale is executive vice-president and chief operating officer of Federal Express Corp. The other eight Bridge Communications board members are Chairmen **Philip Greer** and **Robert Loarie,** both of the the investment firm of Weiss, Peck & Greer-Lawrence; **James Anderson,** of the in-

See **People** page 26

AT&T 724 Multiplexer
AT&T DATAPHONE II System Controller
AT&T PC 6300 AT&T Model 4000 Modem
AT&T Multifunction Communication System
AT&T 455 Printer

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Hiring from **page 23**

$40,000 range. He added that some specialized professionals may earn upwards of $100,000 per year. Smith said Dean Witter's communications staff consists of about 80 employees, about 20 of whom are considered senior level professionals.

Offer realistic salaries

Jerry McGrath, director of information processing at *The New York Times*, said the newspaper has also solved its hiring problems by offering top dollar to communications employees. "Let's just say we pay very well," said McGrath, who declined to be more specific about the salaries offered by the *Times*.

According to McGrath, employers must be prepared to offer realistic salaries to communications personnel in order to attract top-flight professionals. "Many companies have a cadre of management people left over from the old communications days, and they just don't know what these new employees are worth," he said.

R. Keith Gwinne, superviser of communications at Monsanto Research Corp. in Miamisburg, Ohio, said, "Sometimes I feel like I am underpaid when I hear what prospective employees are asking for salaries."

Gwinne said he hired a senior voice communications employee last fall. "I found it difficult to find someone who met company qualifications, which included having a degree and not asking for a salary higher than the company was willing to pay."

College degrees expected

Gwinne said it took nearly a year to find an employee with the required experience, but that individual did not have a college degree. He had to win upper management's approval before bringing the employee on board.

"Our company expects at least a bachelor's degree for all professional-level employees," Gwinne said. "A lot of people have seat-of-the-pants experience — the phone company guys, for example — but they don't have that all-important degree."

Gwinne said his company has 12 senior-level communications employees. He said senior-level salaries range from a low of $30,000 to the mid-$40,000 level.

Communications executives and recruiters agreed that colleges and universities — such as the University of Colorado and George Washington University, which offer telecommunications degrees — have not produced enough graduates to have an appreciable impact on the job market. ☑

People from **page 23**

vestment firm of Merrill, Pickard, Anderson and Eyre; **Dixon Doll,** president and chief executive officer of the DMW Group, Inc.; **Andrew Gaspar** of the investment firm E.M. Warburg, Pincus and Co.; **Boris Petrov,** independent consultant; **Judith Estrin,** Bridge Communications executive vice-president; and **William Carrico,** Bridge Communications president.

Robert Annunziata and **Ronald Cowan** have been named co-chairmen of the World Teleport Associations' newly formed Americas regional committee. Annunziata is president and chief operating officer of Teleport Communications. Cowan is chairman of Harbor Bay Telecommunications and owner of Doric Development, Inc.

Robert Bressler has joined 3Com Corp. as vice-president and general manager of the Applications Software Division.

William J. Adams was appointed vice-president and general manager of Harris Corp.'s Digital Telephone Systems Division.

Stephen Lunsford, voice network manager for the First Tennessee Bank in Memphis, has been elected "Professional of the Year" by the Tennessee Telecommunications Users Association. Lunsford is president of the National Rolm Users Group and Rolm Liaison Committee chairman.

Hilary Thomas has joined Videodial, Inc. as vice-president.

Christopher Allen has joined the technical services staff at Integrated Network Systems, Inc.

Alois Strnad was appointed to the post of vice-president of management information systems at Tandem Computers, Inc.

Jack W. Blumenstein was appointed vice-president of the business communications group at Rolm Corp.

John Singleton was named executive vice-president and chairman and chief executive officer of Security Pacific Automation Co.

John Liskey was appointed to the position of general manager at United Cable Television Corp.

David Jacobs was appointed executive vice-president of Carlini & Associates, a consulting firm.

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NEW PRODUCTS AND SERVICES

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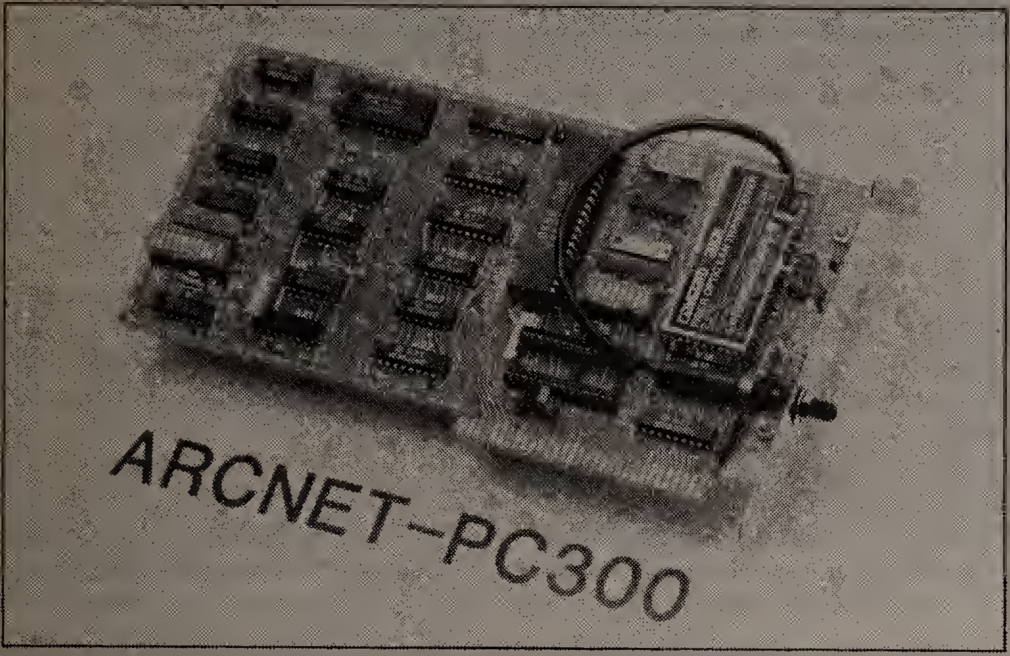
- ▶IBM-to-Ethernet interface
- ▶Hayes personal computer modem
- ▶Three links to IBM minis



▶ STANDARD MICROSYSTEMS CORP.

Arcnet expanded

Fiber-optic board extends local net.

HAUPPAUGE, N.Y. — Standard Microsystems Corp. introduced a fiber-optic expansion board designed for Datapoint Corp.'s Arcnet local-area network.

The product follows the recent release of a board supporting multiple personal computer access to Arcnet on a single line.

The fiber-optic Arcnet PC300 expansion board increases the distance IBM Personal Computers can be from the Arcnet hub from 2,000 feet to 4,000 feet. The Arcnet PC300 uses the 200-micron, single-fiber, optical cable found on Raycom Systems, Inc.'s 3101 fiber-optic transceiver driver as a transmission medium.

The company's Arcnet PC200 board connects up to eight personal computers to a single line at distances up to 1,000 feet.

By using a HYC9058 High Impedance Transceiver that provides transmit and receive filtering, the Arcnet PC200 reduces or eliminates the need for an active or passive hub.

Both boards handle all protocol conversions needed to access the Arcnet and contain an on-board, 2K-byte data packet buffer supporting four pages of dynamically user-defined packet storage providing double buffering of transmit and receive functions.

They also have an 8K-byte programmable read-only memory, which supports access to the local-area network from a floppyless personal computer.

The $995 Arcnet PC300 expansion board will be available in June.

The Arcnet PC200 board costs $595 and is currently available.

▶ LOCAL NETS

Novell users get control

Two new programs give a window onto the system.

BY MARY PETROSKY
West Coast Correspondent

User demands for improved security and management of personal computer local-area networks have prompted two independent service companies to supply those capabilities through recently developed utility programs that complement Novell, Inc.'s Netware operating software.

> *"User demands for improved local net security have prompted two companies to supply those capabilities."*

Lantight, from Com-Tec Services, Inc. of Houston, provides network security with detailed reports of user and file activity.

The Network Management Report Utilities from J.A. Lomax Associates of Novato, Calif., offer users reports detailing disk utilization, file management and user and subdirectory characteristics.

The shift from single-user microcomputers to networked personal computers has spawned management and security concerns similar to those in minicomputer and mainframe environments, according to officials of both companies.

"Information that at one time was decentralized, with security access that was perhaps customized for each location, now is centralized," said David Heath, Com-Tec's business manager for software services.

Com-Tec, a microcomputer service company and local-area network dealer, developed Lantight in response to client demands for a window into the network, Heath said.

Lantight, a 10K memory-resident program, records ongoing network activity by user and by file.

The software can keep track of which users are renaming or deleting files or directories, copying files onto or off of the network or altering file contents. It also records the times during which such activities occur. The network supervisor can specify which users are monitored and for what activities, Heath said.

In contrast to Lantight, the Network Management Report Utilities provide a snapshot of the network at any given time, according to developer John Lomax, president of Lomax Associates.

The company develops custom software, primarily for networks, Lomax said. He developed the program while implementing a 10-node network for a service bureau that had previously operated its business on a Burroughs Corp. mainframe. Lomax was looking for a way to manage the network's 25 users and 250M bytes of disk storage, he said.

The package consists of four reports. Ndisk provides statistics on volume and subdirectory utilization on server disk drives. The sta-

See **Novell** page 28

▶ NETWORK ALTERNATIVES

Incomnet users get satellite link

BY PAUL KORZENIOWSKI
Senior Writer

CHICAGO — Satellite Broadcast Network, Inc. and Incomnet, Inc. last week joined forces to offer their users turnkey computer and communications systems. Satellite Broadcast entered into an agreement that allows it to market Incomnet's line of hardware and software products with its satellite communications systems.

Satellite Broadcast, based here, markets both C-band and Ku-band earth stations. It also leases transponder time, allowing users to transmit data at speeds up to 56K bit/sec on a one-way network. Networks can be configured for either point-to-point or point-to-multipoint transmissions. Incomnet, based in Westlake Village, Calif., produces parallel processing host systems and associated application software. The systems already work with leased-line, dial-up line, packet-switching and telex interfaces.

The Satellite Broadcast agreement enables Incomnet to add a satellite link option to its offerings. Geographically dispersed Incomnet processor users could share information via Satellite Broadcast's satellite services.

Incomnet said Pacific Bell last year ordered $5.7 million worth of Incomnet equipment.

PRODUCTS & SERVICES

Five fiber-optic multiplexers

FiberCom, Inc. introduced a line of five fiber-optic multiplexers for interconnecting data terminal equipment to central processors in building or campus configurations.

The **FDM-16, FDM-16S, FDM-32** and **FDM-96** models support connection of RS-232-compatible devices to hosts with RS-232 connections, including those made by Digital Equipment Corp., Prime Computer, Inc. and Honeywell Information, Inc. The FDM series transmits at speeds up to 38.4K bit/sec over distances of up to 3.1 miles. The FDM series supports from 16 to 96 channels and synchronous or asynchronous transmission. The **FWM-32** has modules supporting eight, 16, 24 or 32 channels transmitting to the Wang Laboratories, Inc. OIS, Alliance or VS systems.

Pricing for the FDM series ranges from $38 to $147 per port. The per-port price for the FWM-32 is $180.

FiberCom, Inc., P.O. Box 11966, Roanoke, Va. 24022 (703) 342-6700.

Fiber-optic channel extenders

T-Bar, Inc. introduced four fiber-optic channel extenders, increasing the distance terminals and peripherals can be separated from a T-Bar matrix switch and an IBM mainframe from 400 feet to up to three miles. The company also enhanced its **DSM 2001** distributed matrix switch.

The **CSM 3244** channel drive extenders are designed for campus configurations. The CSM 3244-1 supports speeds of 43K bit/sec over a 1.24-mile line. The CSM 3244-2 supports speeds of 76K bit/sec over sixth-tenths of a mile and up to 43K bit/sec over a 3.1-mile line. The CSM 3244-3 supports block transfers at speeds up to 1.4M bit/sec over a 1.24-mile line. The CSM 3244-4 also supports block transfers at speeds up to 1.4M bit/sec over distances of 3.1 miles. The channel drive extenders can link to the bus and tag lines on the mainframe or connect into a switch matrix.

Prices for the CSM series are as follows: $16,000 for the CSM 3244-1, $19,000 for the CSM 3244-2, $24,000 for the CSM 3244-3 and $27,000 for the CSM 3244-4.

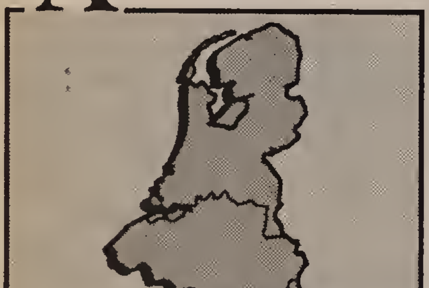
The DSM 2001 was enhanced with extended separation, increased data rates and a new personal computer multidrop feature.

The distance between its DSM Galaxy central and satellite units was increased from 50 feet to 250 feet. The DSM Galaxy is a nonblocked 2,048-port distributed switch matrix configured in a satellite architecture that can connect with a 320-port DSM Monolith stand-alone switch matrix. In addition, the throughput for the Galaxy and its satellites was increased to 153.6K bit/sec. The DSM Monolith can now support up to 307K bit/sec.

Also added was a multidrop feature allowing a single personal computer to control any combination of up to eight Galaxy or Monolith switches as long as the aggregate port total does not exceed 4,096.

The cost for a typically configured 1,056-port system incorporating the recently announced features is estimated at $400,000. The multidrop feature upgrade costs $200 or $500, depending on whether the personal computer was purchased from T-Bar as a part of the system.

T-Bar, Inc., 141 Danbury Road, P.O. Box T, Wilton, Conn. 06897 (203) 834-8227.



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CW Communications has two publications covering the computer market in The Netherlands; *Computerworld Netherlands* and *PC World Netherlands.*

Computerworld Netherlands is a weekly newspaper for over 37,500 computer professionals and computer industry executives.

And *PC World Netherlands* is published eight times a year for over 15,000 IBM PC and compatible product end-users.

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Mainframe to Ethernet interface

Advanced Computer Communications announced a communications interface that enables IBM mainframes to communicate over an Ethernet local-area network.

The **ACS 9310** works with Transmission Control Protocol/Internet Protocol (TCP/IP) networking software to route data through a network. The product uses a version of the University of California at Los Angeles Arpanet Control Program software that runs under IBM's MVS operating system to connect the various systems.

Using multiple Motorola, Inc. 68000 microprocessors and its Versabus, the ACS 9310 connects the host's block multiplexer channel to a standard 10M bit/sec Ethernet. It supports file transfer, electronic mail and virtual terminal access between a host and terminals, workstations and other computers. ACS 9310 costs $35,000.

Advanced Computer Communications, 720 Santa Barbara St., Santa Barbara, Calif. 93101 (805) 963-9431.

Security features for AISwitch

Applied Innovation, Inc. introduced a security device for its AI-Switch 170 series of data personal branch exchanges.

The **AI174** four-port interface card supports up to four users and offers security and least-cost routing features. Security measures include a dial-back feature, roamer security for remote users calling in from various locations and caller dial back that combines dialback security and least-cost routing.

Access privileges can be added, changed or deleted from the AI-Switch itself. Host level password and host restriction security features are also included. A hard copy log notes the time and date of each call, and whether it was successful or invalid. A 24-digit dialing dictionary for access to alternate carriers like MCI Communications Corp. and GTE Sprint Communications Corp. can be defined.

Each four-user AI174 port card costs $1,500.

Applied Innovation, Inc., 2764 Sawbury Blvd., Columbus, Ohio (614) 764-2400.

X.25, X.75 protocol tests added

Atlantic Research Corp. added new **X.25 and X.75 testing functions** to its Interview Comstate II protocol analyzer.

The new features, which can be added to existing units through an upgrade kit, include expanded address fields of up to three octets, a monitor trace that decodes variable length address fields, automated handling of modulo 8 and modulo 128, tracking for seven logical channel numbers, a poll/final bit loopback and display of all red book mnemonics for frames and packets. Tests can be prepared without the variable required in X.25 and X.75 procedures.

The unit uses the last logical channel number received to transmit messages back to the device under test and keeps track of the poll/final bits on the circuit under test to ensure final bit status is the same as the poll bit. An Interview Comstate II unit with the new features costs $19,900. An upgrade kit adding the features to existing units costs $800.

Atlantic Research Corp., 5390 Cherokee Ave., Alexandria, Va. (703) 642-4000.

Three links to IBM minis

Avatar Technologies, Inc. introduced three products that link IBM System 34, IBM System 36 and IBM System 38 minicomputers to personal computers, Ascii terminals and printers.

The **PA300** personal computer expansion board provides terminal emulation file transfers and multi-

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Novell from **page 27**

tistics include the amount of space a subdirectory occupies — a characteristic also given as a percentage of the total volume size — and the number of files in a subdirectory.

Nfile supplies file-related information, such as when a file was created and when it was last accessed.

The third report, Nuser, provides a listing of all current users and their access privileges, while the fourth report, Ndir, provides similar information by subdirectory.

Both Com-Tec and Lomax Associates plan to sell their programs through Novell.

Pricing for Lantight has not been set, but the package will cost less than $500 per network server, Heath said. A multiple file server version will also be available, he said. The Network Management Report Utilities are bundled together for $59.95.

ple sessions between the IBM Personal Computer line and IBM System 34, IBM System 36 and IBM System 38 minicomputers.

The personal computer mimics IBM 5251, IBM 5291 and IBM 5292 terminals and connects to an IBM 5294 controller over twinaxial cable. The device supports up to seven concurrent host sessions with full windowing capabilities and allows users to toggle between personal computer and host functions.

Each PA300 costs $895.

The **MPA6000** protocol converter was enhanced to provide IBM 5251 model 12 terminal or IBM 5294 remote controller emulation for up to 28 Ascii devices.

It provides up to four controller modules for each system with each module supporting up to nine devices.

A MPA6000 with two synchronous ports and six asynchronous ports is priced at $4,500.

The device can support an aggregate of 30 ports.

A pair of **DC302** cable adapters can be used with twisted-pair wiring to connect a pair of twinaxial cable devices that are up to 1000 feet apart. One twinaxial cable device plugs into one side of a DC302. The other side of the DC302 uses an RJ-11 telephone jack. A second DC302 reverses the flow at the other end of the wire.

The DC302 costs $130 per pair.

Avatar Technologies, Inc., 99 South St., Hopkinton, Mass. 01748 (617) 435-6872.

LU 6.2 supported E-mail

Applied Data Research, Inc. released a new version of its ADR/eMail software that now supports IBM's LU 6.2 communications protocol.

ADR/eMail 2.1 runs on IBM Series 370, IBM Series 3000 and IBM Series 4300 mainframes using IBM's CICS communications software or ADR's Roscoe operating system.

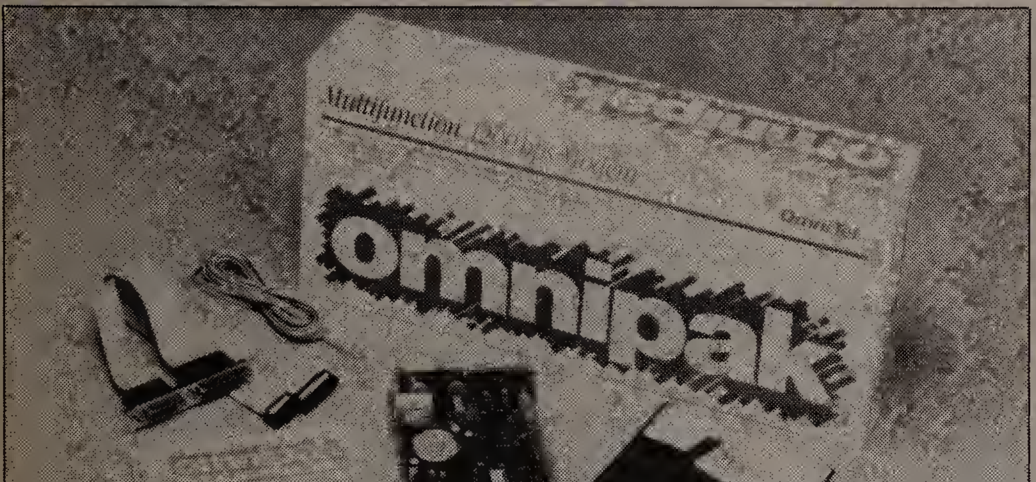
Using a Telex interface running on a Philips DSX-40 minicomputer, the new release enables terminals to send and receive Telex messages.

ADR/eMail's System Interface capability allows users to develop interfaces with other Telex devices. The new release adds left and right scrolling commands and a 220-character-wide screen message display feature that can access information from spreadsheets and extended text.

ADR/eMail Release 2.1 has a permanent license price of $45,100 for an operating system environment.

Its permanent license price for disk operating system environments is $22,400.

Applied Data Research, Inc., Route 206 and Orchard Road, Suite CN-8, Princeton, N.J. 08540-9936 (800) 237-9273.



▶ OMNITEL, INC.

Modem kit introduced

A modem expansion board designed for the IBM Personal Computer line was introduced by **OmniTel, Inc.**

The **Omnipak** kit includes an expansion board containing a Hayes Microcomputer Products, Inc.-compatible 1200 baud or 300 bit/sec modem.

The modem can be upgraded to support 2,400 bit/sec transmission. The product supplies call progress reporting functions.

The Omnipak kit also includes communications and utilities software, a random-access memory software disk, print spooler capabilities and a clock/calendar.

The board comes with 384K bytes of memory, has a parallel port and serial port and requires a single expansion slot on the IBM Personal Computer.

The Omnipak is priced at $499.

OmniTel, Inc., 5415 Randall Place, Freemont, Calif. 94538 (415) 490-2202.

Personal computer card modem

Anchor Automation, Inc. introduced an expansion card modem for the IBM Personal Computer line.

The half-card **Lightning-i** is a two-wire, full-duplex modem that supports asynchronous data transmission at speeds up to 2,400 bit/sec. The devices will automatically fall back to rates of 1,200 bit/sec and 300 bit/sec whenever there is a line problem. The modem comes equipped with Norton-Lambert Corp.'s Lync communications software, which is compatible with Hayes Microcomputer Products, Inc.'s Smartmodem command set.

The device has autodial, automatic answer, redial and hangup features. An unattended operation feature allows users to program the modem to call and retrieve information at specified times. The device includes an unlimited telephone directory and provides password security and diagnostic capabilities.

Lightning-i is priced at $499.

Anchor Automation, Inc., 6913 Valjean Ave., Van Nuys, Calif. 91406 (818) 997-7758.

Switching multiplexer

Astrocom Corp. introduced a multiplexer that enables IBM 3270 Category A terminal users to switch between sessions controlled by up to three IBM 3274 controllers.

The **Easy II Manager's** menu-selectable options allow users to gain access to a busy controller or contend for a second device. Users can also program the order in which controllers are polled or establish dedicated connections. The Easy II Manager works with Astrocom's line of Coax Squeeziplexer muxes.

Prices for Squeeziplexers, equipped with the Easy II Manager, start at $3,415.

Astrocom Corp., 120 W. Plato Blvd., St. Paul, Minn. 55107 (612) 227-8651.

X.25 gateway for PBX

A gateway linking Northern Telecom, Inc.'s Meridian private branch exchange systems to the X.25 public packet-switching network was introduced by **Dynapac Packet Technology, Inc.**

The **PBX.25 Gateway** connects a PBX's RS-422 ports directly to an X.25 network or to other communications equipment that supports X.25 protocols. Multiple PBXs can be linked together through leased telephone lines or public data networks by installing PBX.25 Gateways at each location.

The PBX.25 Gateway provides a variety of security functions, has call-logging capabilities for each port and has alarm outputs to notify network administrators of problems.

A 16-port version of the PBX.25 Gateway is available for $7,240.

Dynapac Packet Technology, Inc., 6464 General Green Way, Alexandria, Va. 22312 (800) 622-8878. Ask for publication #64.

Hayes half-card Smartmodem

Hayes Microcomputer Products, Inc. introduced a half-card version of its Smartmodem 1200B personal computer expansion card.

The **half-card version** contains full-card features, including support for transmission at a constant 1,200 bit/sec or varying speeds as low as 300 bit/sec.

It is compatible with Hayes' Standard AT Command Set and CCITT V.22 standards. The half-card version of the Smartmodem 1200B, with Smartcom II communications software, is priced at $595.

Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, Ga. 30348 (404) 449-8791.

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TECHNOLOGY

MARK WINTHER

The future? Plastics

Plastics are the future. This prediction, as foretold to Dustin Hoffman in *The Graduate*, held true for financial institutions and retailers in the development of credit cards. Such institutions would also do well to automate transaction processing and point-of-sale (POS) authorizations, much of which is still done on paper.

Less than half of the seven billion charge and credit card transactions that took place in 1985 were authorized at the POS. Credit card transactions under $50 are usually not authorized, and higher amounts are authorized by making a time-consuming voice telephone call to a service bureau.

Meanwhile, the problem of credit card fraud is making it increasingly important to authorize every transaction. Automated POS systems make this possible.

The cost of electronically authorizing a transaction is about 12 cents, whereas the cost of making a call to a service bureau is 60 cents.

Banking institutions handled 3.6 billion automated teller machine (ATM) card transactions in 1985. Most banks providing ATM services rely on inefficiently used leased-line networks for which they pay as though they were in use 100% of the time. Packet networks, on the other hand, provide more efficient networks for switching ATMs.

ATM and charge card authorizations have gross annual sales of $1.2 billion, which should perk up the marketing ears of even the most "Bell-shaped" communications companies. As more companies enter this lucrative market, prices are falling and making the technology less expensive for users.

There are some hitches. The majority of credit card transactions are still paper-based, and the banking industry has jealously guarded its role as provider of POS charge card, ATM and electronic funds transfer (EFT) services.

However, nowhere is it written that these are exclusively banking functions. Also, the ongoing convergence of POS, ATM and EFT services means much more sophisticated transaction networking requirements and expensive on-line communications costs.

In short, POS, ATM and EFT transaction services have become a fine art, and banks are not the best artists. Recognizing this, communications companies like AT&T, Bell Atlantic Corp., CompuServe, Inc., GTE Telenet Communications Corp., General Electric Information Services Co. and Tymnet/McDonnell Douglas Network Systems, Inc. are entering the arena with usage-based pricing, hundreds of local access nodes and rapid response times.

The immediate market for these players is in POS electronic authorizations, which are replacing the ineffective printed bulletins and expensive, time-consuming telephone calls widely used today.

Also beginning to emerge is electronic draft capture, which combines credit authorization with computerized capture and transmission of transaction information to bank processors. Ultimately these will grow into full-blown retail information systems that capture everything going on between the clerk and the customer. They will also control the business functions of the retail outlet.

Packet transport networks are especially well-suited to credit card verification services. GTE Telenet, Tymnet and H&R Block subsidiary CompuServe have been quick to enter the credit card authorization business. Tymnet supplies network telecommunications services to Mastercard, and CompuServe works with Visa.

Both companies support some American Express services. GTE Telenet works with National Data Corp., an Atlanta-based card processor. Western Union recently announced an agreement with National Bancard Corp. (NaBanco), a Fort Lauderdale, Fla.-based transaction processor, to supply network telecommunications services for NaBanco's nationwide retailer client base.

Winther is director of New Communication Services at Link Resources Corp. in New York.

BOCS

BRIAN JEFFERY

RBOCs 1, consumers 0

When the regional Bell operating companies were first set free from AT&T, they thought they would be impressive new players in the fast-evolving world of information processing. They felt, as one RBOC executive put it, like "kids in a candy store."

Many of them rushed into one new market after another and began selling — or reselling — minicomputers, personal computers, local-area networks, voice/data systems, fiber optics and systems software.

In retrospect, it is remarkable that anyone thought the RBOCs would shine in other lines of business.

The computer and communications businesses were already overcrowded, and the market slowdowns that struck in 1985 and 1986 suggested that the last thing needed was a whole new field of vendors.

Much of the RBOCs' expansion was misguided, despite their awesome expenditures on consultants. As a group, they are now retreating from many market areas, and few have met the ambitious targets they set for themselves in the computer business.

After entering the market, they soon realized there was not a desperate need for more minicomputer systems houses. They started into personal computer retailing at a time when that sector was showing signs of acute overcrowding, and it is now in headlong retraction.

Most RBOCs are scaling back on their computer marketing plans. Nynex Corp., with its recent acquisition of the IBM Product Centers, is a notable exception. Although there have been some successes, overall, the brave new world of the diversified independent RBOCs has failed to materialize.

In the meantime, as any telecommunications user can tell you, services have deteriorated pretty much across the board.

It is little consolation for the average user to know that while his telephone service may have grown both worse and more expensive, his local phone company is lavishing millions on joint ventures, acquisitions and diversifications.

The problem is that telecommunications deregulation has been conducted with only the fuzziest idea as to what may or may not be good for the industry and its consumers. The assumptions seem to have been that deregulation and divestiture would create competition, that competition would be a good thing and that giving chief executive officers freedom of action would result in benefits for everyone.

Overall, a belief seems to have developed that the basic purpose of deregulation revolves around the benefits to vendors, not consumers.

But while the industry scarcely needed a new field of large and well-financed vendors, the public would certainly have benefited from channeling the resources of the RBOCs into improving the quality and reducing the cost of basic telecommunications services.

That would at least have been a reasonable justification for the continuation of their monopoly on local telephone service.

There is an interesting parallel here with the deregulation of the airlines. There, too, there does not seem to have been any recognition that the introduction of strong across-the-board competition would result in a potentially dangerous deterioration in service and in the maintenance of equipment.

In both cases, the reluctance of the regulatory agencies to accept any real and ongoing degree of responsibility for the consumers' interests has been striking.

An efficient and reliable telecommunications system is a basic requirement for any country's successful economic performance. The improvements and cost reductions that can be effected here are directly reflected in the health of the economy, the growth of employment and the provision of goods and services to consumers. In this sense, telecommunications ranks in importance with water, energy and the other services normally classified as utilities.

In the interest of consumers, the information-processing industry and even the country as a whole, might it not have made more sense to keep the RBOCs focused on basic communications services? Instead, RBOC resources and management attention have been diverted into markets where they are not needed and where they contribute little that is not already available from a large and competitive field of specialized and competent suppliers.

This result wasn't necessary or desirable by any criterion other than the financial ambitions of the RBOCs. The interests of consumers of telecommunications products and services are at best only marginally served.

Jeffery is research director at the International Technology Group in Palo Alto, Calif.

Telephone company participation in value-added services covers the three aspects of noncash consumer purchase operations — terminals, networks and processing.

They are in the terminals business with coin- and card-operated telephones and are in the processing business with the 60 million telephone calling cards in circulation. The local exchange companies are in the networking business with their recently authorized local packet networks. AT&T offers a national POS service on the Accunet packet network.

Mellon Bank N.A. is currently working with Bell Atlantic to test POS credit authorizations via packet switching in Philadelphia and Allentown, Pa., and in Wilmington, Del. AT&T is supporting a POS program instituted by CoreState Financial Corp., parent of Philadelphia National Bank, for Sun Refining and Marketing Co. Sun Refining has 1,350 Sunoco gas stations in 14 states and the District of Columbia.

In January, General Telephone of California, a GTE company, acquired the assets of National Transactions Systems, Inc., an El Secundo, Calif.-based partnership that operated 400 off-premises ATMs in California Safeway and 7-Eleven stores.

Last month, a US West, Inc. subsidiary acquired Applied Communications, Inc., a leading developer of ETM software with applications in ATMs, POS systems, home banking, cash management and wire transfer software.

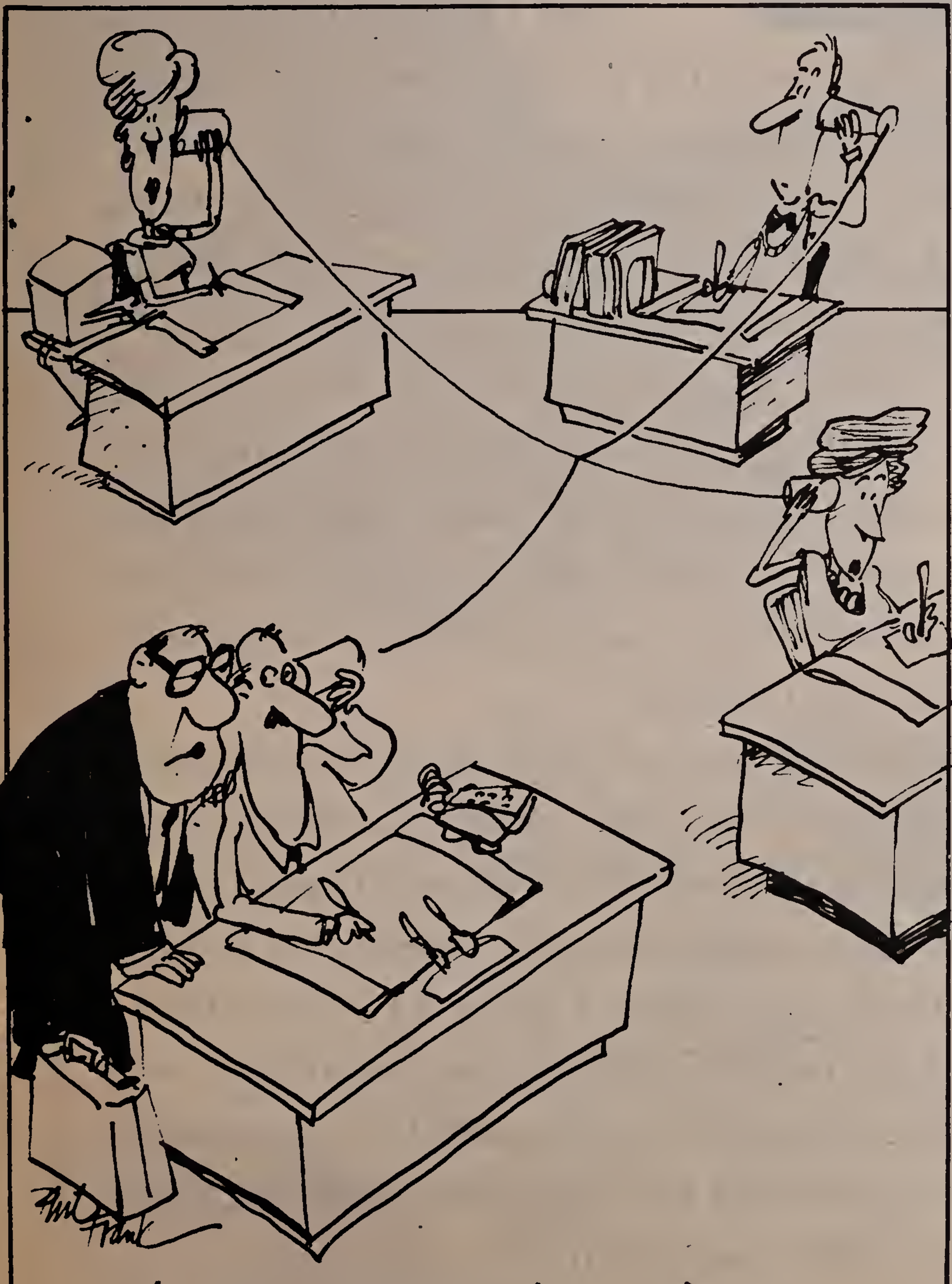
If this all sounds too good to be true, another emerging technology may make the cost of transaction processing and authorizations even lower — the French-invented smart card. The smart card is a multifunction transaction card that has its own microprocessor chip.

Described as a bank branch in your pocket, the smart card could carry a consumer's checking, savings, money market and credit card accounts, plus a transaction record of each on the same card. Both Visa and Mastercard have announced smart card programs.

The availability of large amounts of inexpensive storage has consequences that go beyond merely reducing paper buildup. Smart cards enable users to bypass expensive on-line communications charges. By permitting off-line

See **Technology** page 41

Teletoons — By Phil Frank



IT'S THE CHEAPEST LOCAL AREA NETWORK WE OFFER...

SHARED SERVICES

JAMES CARLINI

Management perspective

Few are better placed than property managers to witness the ups and downs of the nascent shared tenant services industry. In this interview, Stephen P. Duerkop, senior group vice-president in charge of the Western Group of JMB Property Management Division, offers the real estate perspective on shared tenant services.

During his 18 years in the real estate business, Duerkop has managed both industrial and commercial properties. His current responsibilities include more than 10 million square feet of office space and 8,000 apartments.

What is your philosophy on offering shared tenant services in the buildings that you manage?
Basically, it makes sense. The services offered should fit the needs of the tenant. We have different office buildings in both urban and suburban settings.

The tenants within those environments require services that can be offered through a shared tenant operation. It is essential to structure the services to fit the users' needs and to limit these services so that they can be properly managed and marketed.

Because this is a new concept, the services have to be proven in the eyes of the tenants.

A desirable approach would be to offer telephone services initially and then expand the offerings to meet different tenant business needs.

If we phase in the services, we have a better chance of success.

We are looking at the practical needs of tenants and their businesses rather than applying technology for technology's sake. We want the services to be used and not viewed as just a marketing tool to fill up the building.

Is there a vendor approach that is responsive to your needs as a property manager?
Not in all cases. The decision to implement shared tenant services goes beyond selecting communications hardware. You have to find a partner whose business needs match the needs of the property owner. The vendor must be service-oriented.

It is very difficult to find a vendor that has a basic philosophy that parallels that of the owner.

What are the key concepts to keep in mind when evaluating vendors?
There are many considerations that affect a decision to go with a certain vendor. There has to be a financial fit between the owner, the supplier of services and the tenants. The capabilities and restrictions of a particular office building are also key factors.

Evaluating the technologies requires a particular expertise. Just as we bring in lawyers and accountants to review the legal and financial aspects of the shared tenant services business, we need to bring in experts to review the technological ramifications of what we are contemplating offering in our buildings.

What was the biggest problem you faced with your retrofit of the Seafirst building in Seattle?
Understanding the vendors' capabilities, long-term strategies, their overall approaches and their track records, which in most cases are very short, proved to be the biggest jobs.

Do you think other developers and property management companies face similar problems?
They have the same problems trying to understand these new concepts.

Where the problems can become unique is the actual application of this intelligent building concept to their individual properties. Tenant mix, geographical location, vendor support and other factors are all different depending on which area of the country you are in.

If you could change anything in this developing industry, what would it be?
It would be beneficial if we had a supplier or host of these services that had guidelines or standards.

We could then compare capabilities and products of the different vendors.

See **Shared services** page 41

Carlini is president of Carlini & Associates, a management consulting firm in Westmont, Ill.

NETWORK WORLD

Features

May 26, 1986

IBM's ad-hoc strategy
Debunking the myths about IBM's office automation initiative is the first step toward understanding its mix-and-match product line. IBM is attempting to pull its systems together under one umbrella of Systems Network Architecture compatibility as it tests the waters of users' needs.
This page.

IBM's Terry R. Lautenbach
In this exclusive *Network World* interview, Terry R. Lautenbach, president of IBM's Communication Products Division, speaks out on a wide variety of user issues, including management education, IBM's growing interest in providing integrated solutions to customers, and domestic and international standards.
Page 36.

▸ OFFICE SYSTEMS

IBM's ad-hoc strategy

The System/36 is out, and the new 4300 Series machine takes over in 1987. The Professional Office System (Profs) gets LU 6.2, and Disoss is dead. IBM's VM operating system is the key to it all. Topview is the strategic Personal Computer operating system, the Intelligent 3274 replaces everything else and kills the competition, and the Token Ring is the Number 1 IBM product for the 1990s.

You've probably heard a lot of this sort of thing, about IBM wonder-products pelting down and zapping competitors and existing IBM products. It is a style often used by what might be called the space invaders school of IBM watching. Much of the time, it is an oversimplification.

As is usual with IBM, the reality is more complicated — and a little duller. IBM's office automation scenario is shaping up as a mix-and-match assortment of offerings that respond to user needs and support various environments (see Figure 1). These offerings are pulling together under a software umbrella that provides compatibility through the components IBM has been building into Systems Network Architecture since 1980 (see Figure 2).

☞ Continued on **page 34**

TOM BARRETT

From **page 33**

Notable here are the Document Interchange Architecture and Document Content Architecture (DIA/DCA), which standardize text document formats and allow for transfers of documents between IBM systems.

Also important is the complex built around the LU 6.2 SNA format, which manifests itself as SNA Distribution Services, Advanced Program-to-Program Communications, Application Program Interfaces (API) and the like.

The LU 6.2 complex allows peer-to-peer communications between IBM systems.

In effect, an IBM system with the right software can talk to a similarly supported IBM system. Under this software umbrella, IBM offers the following:

- *Disoss*. A document processing, management and filing system for host DOS, MVS and MVS/XA systems.
- *Profs*. A combined text and management support system for host VM environments.
- Displaywrite/370, a recycled version of Displaywriter word processing software supported on both Profs and Disoss hosts.
- The System/36, described by IBM as its principal departmental, or intermediate level, system.
- The Token-Ring Network, announced last October, is IBM's principal local-area network for work groups. Because of distance limitations over standard twisted-pair wiring, however, the Token-Ring Network works out to be a 72-user system. IBM seems to think that 72 users is about right for this level.

> *“In effect, an IBM system with the right software has the capability to talk to a similarly supported IBM system.”*

The System/36, upgraded in January, now also supports 72 users, as does IBM's PC Network. However, it's not clear what the difference is between a 72-user department served by a System/36 and a 72-user work group served by a Token-Ring or PC Network.

- The 3274, which made its debut in the office automation world in October.

Previously known to us all as a cluster controller, IBM declared it a “key component of work group connectivity.” Presumably, this is what the long-awaited 3274 systems are about.

- Personal Computers. These are *the* workstations, as IBM never tires of repeating. This makes sense: In most large end-user organizations, Personal Computers have become standardized and have knocked the bottom out of the demand for sophisticated high-end 3270 terminals.

IBM spends much of its time these days trying to make Personal Computers look like 3270s. Personal Computers are in the process of getting most 3270 functions, and the latest flavor of Topview has LU 6.2 support.

The above may be configured according to end-user needs: Profs or Disoss for hosts; a 3274, System/36 or Token Ring as an intermediate level, such as in a department or work group; and Personal Computers as workstations.

> *“Personal Computers have become standardized and have knocked the bottom out of the demand for sophisticated high-end 3270 terminals.”*

Everything has or will get LU 6.2 support, and communicating is easier with compatible versions of the following software:

- Displaywrite for Personal Computers, Displaywrite/370 for hosts, Displaywrite/36 for System/36s.
- Personal Services, for Disoss environments (Personal Services/370, Personal Services/36 and Personal Services/PC). These handle text transfers between their respective systems.

Continued on **page 35**

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- Various System/36 software products supporting Personal Computers, for departmental Personal Computer users with a System/36 system.
- Profs/Personal Computer Support, for communicating directly between Profs and Personal Computers. In contrast to the Disoss environment, IBM doesn't push the System/36 as an intermediate level between hosts and workstations.

There is always the Rolm Corp. CBX II. IBM now supports it for communicating with hosts via a 3700 Series front-end processor with the System/36, System/38 Series/1, Personal Computers and terminals. The scenario doesn't change; the wires just run in different directions and give a little more linking flexibility.

IBM will say that its mix-and-match approach provides users with the flexibility and support for varied installed bases and existing investments that more elegant office automation systems don't offer. Cynics attribute it to IBM's apparent inability to coordinate its product strategies ahead of time, and it always has to write new SNA software to make incompatible systems talk to each other.

The important thing in all of this is not so much the individual components as the software umbrella.

Underneath the umbrella are all of the mechanisms to handle data, text (DIA and DCA), image (Scanmaster image-processing) and graphics (the complex of facilities under 3270 extended data stream). All of these function within the LU 6.2 format for peer-to-peer communications and are supported by the Token Ring for those who want local-area network capability. For the user interested in private branch exchanges, they will also eventually be supported by the Rolm CBX line.

IBM has started weaving in voice too, judging from the October release of the Voice Communications Option (VCO) add-on for Personal Computers. The VCO can co-reside with a Token-Ring adapter, use an API, develop voice overlays for DIA/DCA applications and literally talk to System/36, System/38 and host DIA/DCA files.

> *"Vendors that persist in targeting individual IBM systems are winning battles but may lose the war."*

Evolving products

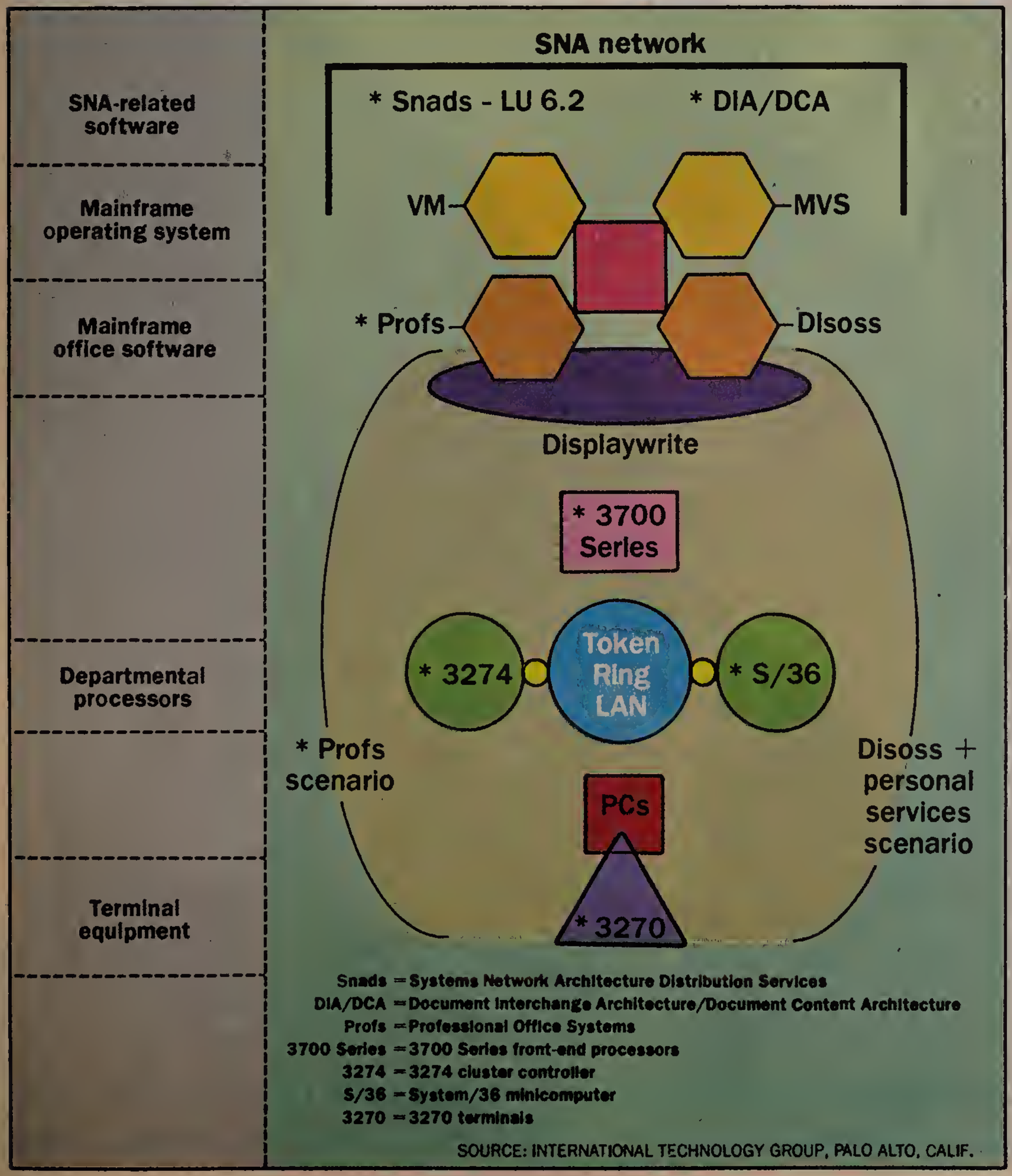
Insofar as IBM has a focus, it is on this software umbrella. This umbrella will determine which operating systems will come, stay and go. Profs and Disoss will doubtless still be around in the year 2000; too many users have either one or the other. The System/36 will beget a 32-bit System/36, and Token Rings will beget new Token Rings. The 3274 cluster controller will beget an intelligent 3274.

Personal Computers will beget new Personal Computers with Topviews and multitasking DOS versions. 4300 Series machines and 80386 supermicrocomputers will become part of the office picture. Finally, the 8100 Series will lose out.

All of this is confusing for IBM competitors looking for something to target. Vendors that persist in targeting the individual IBM systems are reminiscent of the U.S. in Vietnam: They are winning battles, but may end up losing the war.

This isn't a simple scenario, and its real significance is in the fuzzy world of software architecture. IBM has no wonder widgets up its sleeve, and the nearest thing the company has to a master plan is to go on weaving new formats and architectures into SNA. This is IBM, and like so many things, it is just a little more complicated and less exciting than it looks. ◘

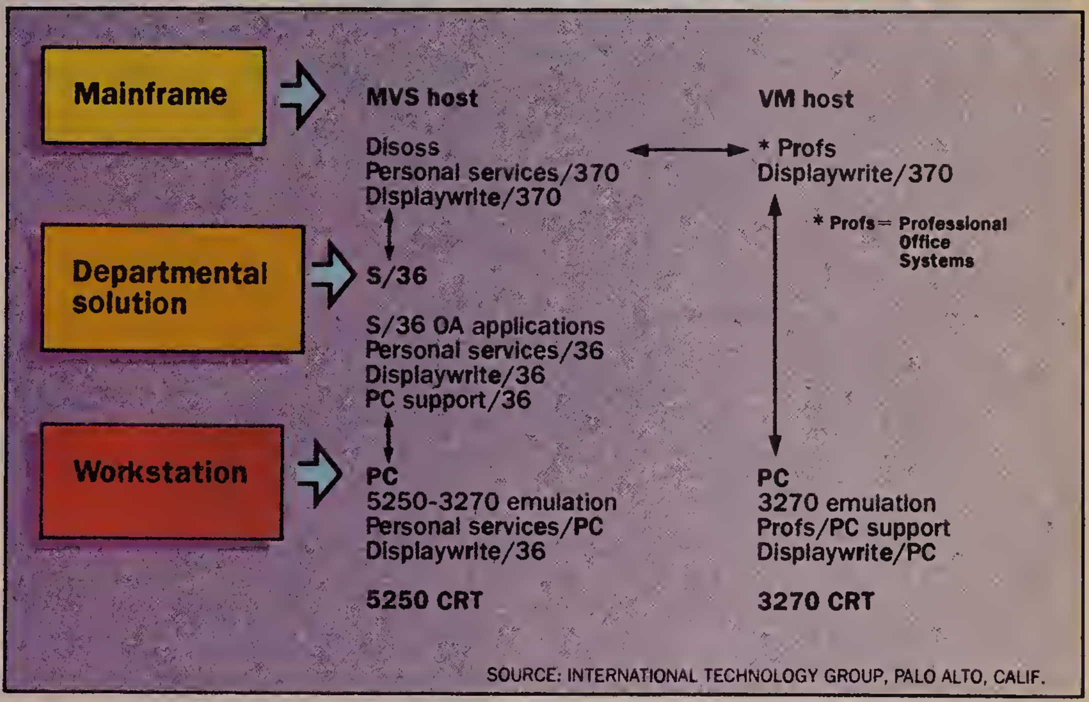
IBM office automation scenario



Snads = Systems Network Architecture Distribution Services
DIA/DCA = Document Interchange Architecture/Document Content Architecture
Profs = Professional Office Systems
3700 Series = 3700 Series front-end processors
3274 = 3274 cluster controller
S/36 = System/36 minicomputer
3270 = 3270 terminals

SOURCE: INTERNATIONAL TECHNOLOGY GROUP, PALO ALTO, CALIF.

IBM office automation software



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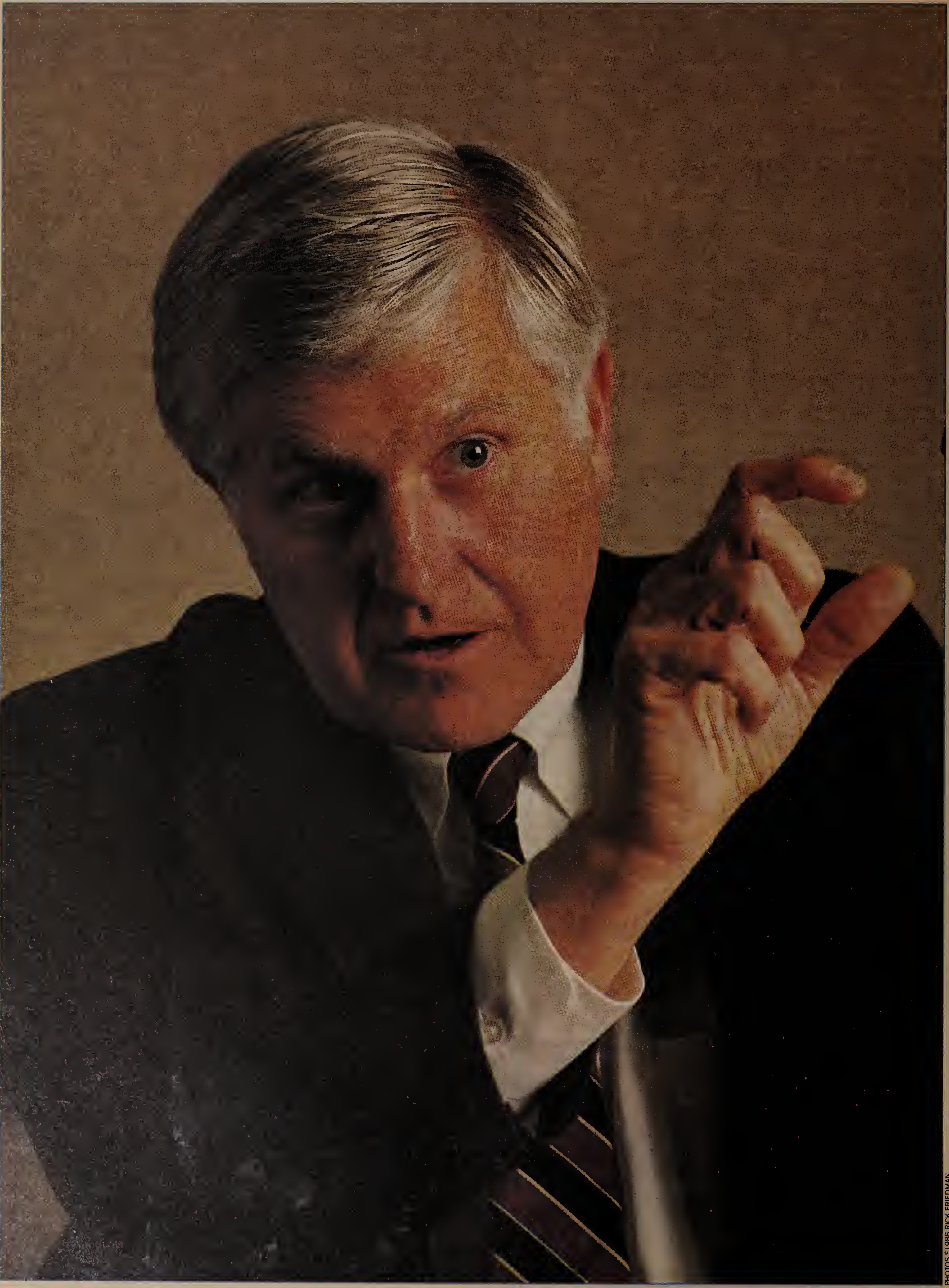

PHOTOS: © 1986 RICK FRIEDMAN

▶ CONTINUED FROM PAGE ONE

IBM's Terry R. Lautenbach

dates back to 1959, when he joined the company in Cincinnati. Since then, he has held a number of marketing and management positions. Most prominently, he was named president of the Data Processing Division in 1976 and president of the IBM World Trade Americas/Far East Corp. in 1978.

It's not hard to believe that Lautenbach comes from a marketing background. His responses are well measured and articulate. He espouses the company line without sounding like a cheerleader. He is as forthright as anyone could want. In other words, he's a good interview.

However, like all good salesmen, Lautenbach knows how to gloss over a problem by failing to acknowledge its existence. Don't look for bad news about IBM from Terry Lautenbach.

Lautenbach, his wife and their six daughters make their home in Darien, Conn. When he's not immersed in work, Lautenbach favors active avocations such as tennis and golf. He's also an avid reader (authors he's read recently include John Le Carre, Robert Ludlum and Sterling Seagrave), and he is vice-president of the board of the Darien Public Library.

In his first major interview with the trade press since taking over the reins of the Communication Products Division (CPD), Lautenbach recently talked with Network World *Editor Bruce Hoard and Features Editor Steve Moore about a host of communications topics.*

Q: Which telecommunications issues are IBM users most concerned with, and how is IBM currently reacting to those concerns?

A: As I talk to customers, the broad issues I hear are connectivity and network management, and what I hear more and more now is this need for integrated solutions to a whole range of problems. So that's really where we're trying to focus.

Connectivity comes in a lot of flavors. There's physical connectivity, and there's logical connectivity. Some people simplify connectivity to mean how you wire it together, and I always assert we can wire anything together if you're willing to pay for it.

I think it's a more substantive discussion to talk about what you do in the logical and application connectivity areas. LU 6.2 is our answer, and we published that. On the other side, depending on how things turn out at the higher levels, we'll implement [Open Systems Interconnect] as well.

In terms of network management, customers want to be able to configure their systems on the fly, to be able to have nondisruptive growth and change their network without bringing the whole network down. I think the SNA network management is vastly superior to anything else. What we have to do is open up network management so other vendors' products can operate within our network management software. I've heard that from so many large customers, but they do want to stay within SNA or use SNA network management.

Third is the need for integrated solutions. Some people say they want end-to-end management, and that's just network management. I'm talking about people who want one vendor to design, install and in some cases, operate their networks for them. I'm hearing more and more of that, even from very large customers.

Q: Early Token-Ring Network users praised the network for its ease of use and functionality, but some cited the network's expense and lack of connectivity to other IBM products as stumbling blocks. What is your reaction to that?

A: As I look back at October, when we announced the [Token-Ring Network],

☞ Continued on **page 38**

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what I heard most frequently from customers was, "What about the System/36," and "How about host attachments for the System/370?" Those were both announced April 16. We also have bridges announced now, so that you can go back and forth to other nets as well. So I think we've expanded the connectivity of the [Token-Ring Network] substantially.

I think the [Token-Ring Network] is a living system in that we're going to attach a lot more equipment to it. I'm not going to say when or what, but it will continue to expand. I think it has rich connectivity today; it will get a lot better in the future.

And I can't pass up the other part of your question. It's expensive vs. who? We think it's competitive, and we spent a lot of time looking at how the competition prices. So if someone says it's expensive, is that compared to the PC Network or compared to what?

Q: How about compared with the AT&T Premises Distribution System?
A: I'm not going to go into specifics, but we think we're competitive.

Q: You mentioned user demand for integrated solutions. It appears that IBM, in conjunction with Rolm Corp., MCI Communications Corp., SBS Dataservice and some of its own ventures, such as Trintex Co., could offer users end-to-end information processing and communications services. Why hasn't there been much movement toward that?
A: I think it's a question of marshaling our resources in terms of how we want to approach some of those opportunities. We think systems integration is not only a business opportunity, but a customer requirement. We have a number of organizations in place today that will begin participating in this. We're going to start opening up our Complex Systems Organization, which is part of our Federal Systems Division, to the commercial market and allow them to bid on a number of these complex jobs.

We also have a Personal Services group, which tends to be more involved with applications development. We'll bring both of them into play because it isn't enough just to have IBM or Rolm, or perhaps MCI, or even the IBM Information Network as a part of a bid. Somebody's got to be the integrator. You've got to have programming skills and project management skills, and those two organizations have those skills.

You'll start to see us bring that together in terms of a business offering, and we're already working with a customer or two now in doing this. We're just not going to be too public about it until we're a little more comfortable with where we are.

"We've expanded the connectivity of the [Token-Ring Network] substantially. I think [the network] is a living system in that we're going to attach a lot more equipment to it. I think it has rich connectivity today; it will get a lot better in the future."

Q: What is the depth of IBM's commitment to the Corporation for Open Systems [COS] and its efforts to test communications products for conformance with international standards?
A: I think our commitment to that is expressed in who I asked to represent us on COS. And that is Ellen Hancock, who is not only an IBM vice-president, but is my vice-president of telecommunications. In addition to representing us, she is on the COS board and executive committee and is busy recruiting new members.

Q: What are the pros and cons of strong user participation in COS?
A: In my view, there can be no cons to user participation. In every public speech I've given since I've been in this job, I've encouraged users to get involved in the standards organizations.

Q: Some users complain that while the System/36 is a very good processor for other applications, it's poorly adapted for departmental computing as espoused by IBM. What's your reaction to that?
A: We're installing System/36s as departmental solutions, and it's been a very successful product for us. Our customers seem to be installing and using them as departmental systems.

Q: So you haven't heard any negative feedback?
A: In my job, I get feedback of all kinds, but I think the System/36 is a good departmental performer. We've been public about the fact that the System/36 is a very strategic product for us at the departmental level, and we plan to enhance that product and make it an even more powerful departmental system in the future.

Q: How are IBM users better off as a result of IBM's acquisition of Rolm?
A: Well, we didn't have any voice capability to speak of, at least in the U.S., so I think Rolm brings a capability now to talk to our customers about their total telecommunications needs. We have the opportunity to marry voice and data and offer our users integrated telecommunications solutions. The other side of it is that, at the departmental or establishment level, customers want a wide range of options. The CBX [private branch exchange] plays a role in that, as do the System/36, the [Token-Ring Network], the [Personal Computer] and the PC Net.

I don't think you can have just one solution. I think you've got to have multiple solutions. So the CBX brings voice; it brings access to the switched network and it brings data. And we're going to continue to develop products together. I spend a lot of time with Dennis Paboojian and the Rolm team — I was just out there with my team. So we'll provide a wider array of solutions for our customers with Rolm on our team.

Q: How long will it be before this relationship really bears fruit?
A: Well, you're starting to see some things already. You've seen the Juniper announcement, which is the Rolmphone and [personal computer] attachment, and we've just announced Phonemail under the VM [operating system]. You'll see more. We're going to continue to press ahead on that. What's the biggest near-term requirement? Network management for the CBX.

Q: How can IBM best leverage its investment in MCI?
A: There will be opportunities for IBM and MCI to bid jointly on some of these integrated solutions I talked about. Customers across the U.S. or around the world who want an integrated solution say, "IBM, we want you to put our networks together with the following kinds of things. You're going to have to have RBOCs involved; you're going to have to have a long-distance carrier." The customer may or may not want to use MCI, but the point is that MCI can play in that game, and I think there will be opportunities where we can work together. We don't have some grand scheme to do that, but we will work together where it makes sense.

Q: Users are attempting to influence vendors' product designs through procurement policies aimed at the vendors' bottom line. Is this a productive way for users to tell vendors what they want?
A: It's an economic fact of life that if users feel some set of standards is terribly important, they will begin to say that in procurements. In the U.S., you don't see that very frequently, whereas you will find in some European requests for proposal, OSI will be specified. OSI is certainly being pressed more aggressively in Europe today than in the U.S., but I suspect we'll see more of that here as COS mines that territory a little more aggressively. Now, [General Motors Corp.] has been doing that successfully with its [Manufacturing Automation Protocol] program, coalescing the industry around a set of standards.

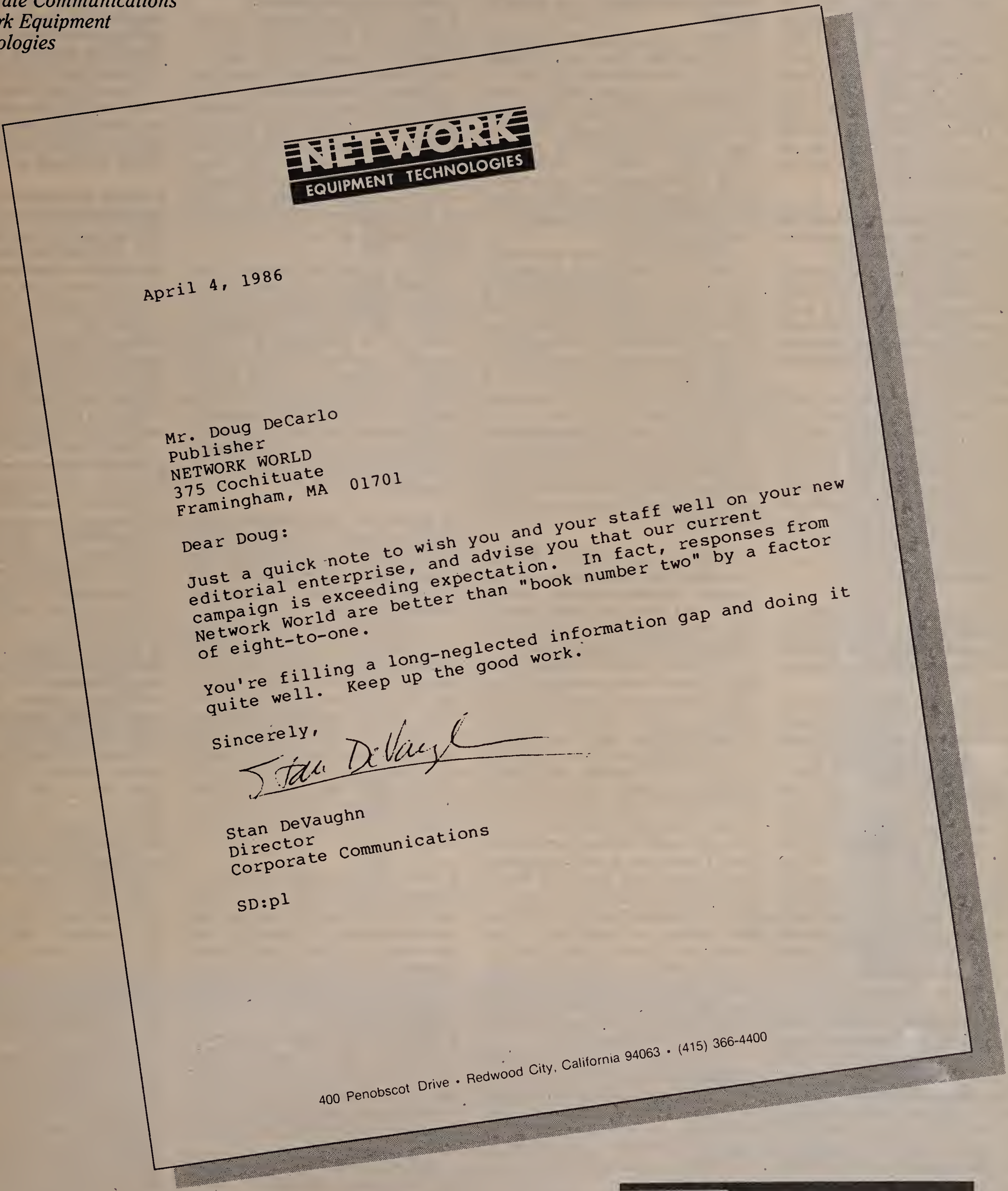
Q: Can you describe any circumstances under which IBM would substantially change SNA to accommodate OSI?
A: SNA and OSI are complementary. I don't believe we have to substantially change SNA to accommodate OSI or vice versa. I think they can work together, and I wouldn't speculate beyond that.

Q: How would you reconcile these two widely different views of OSI? The first, from an IBM press release, states that OSI is intended to provide for communications of data between computing systems that run under different architectures. The second is that of the International Standards Organization (ISO), which originally intended OSI to be a standardized architecture for communications between computing systems that run under different operating systems.
A: I think OSI can be either a native implementation or a gateway, depending upon how vendors choose to implement it. I don't think it makes any difference from the user point of view. Ours will be a gateway off of SNA in and out [of OSI]. I suspect that if vendors have already invested in communications

Continued on page 40

"You're filling a long-neglected information gap and doing it quite well."

Stan DeVaughn
Director
Corporate Communications
Network Equipment
Technologies



NETWORK
EQUIPMENT TECHNOLOGIES

April 4, 1986

Mr. Doug DeCarlo
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Framingham, MA 01701

Dear Doug:

Just a quick note to wish you and your staff well on your new editorial enterprise, and advise you that our current campaign is exceeding expectation. In fact, responses from Network World are better than "book number two" by a factor of eight-to-one.

You're filling a long-neglected information gap and doing it quite well. Keep up the good work.

Sincerely,

Stan DeVaughn
Director
Corporate Communications

SD:pl

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NETWORK WORLD

The Weekly for Leading Users of Communications Products & Services

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A PUBLICATION OF CW COMMUNICATIONS

From page38

network architectures, they'll gateway. If they don't have any, they might build it right off the OSI model.

Q: Are applications-level standards like X.400 also likely to be implemented through gateways?

A: I think you have different choices at the application level, depending on where your own internal development is. If the standards are there before you're implementing it, why not choose the standards? If you must move ahead of the standards, then you're going to have to gateway it to implement it, or you're going to redo your development costs.

Q: Aren't gateways burdensome and awkward for users, particularly for internetworking?

We've talked to people lately who say that especially in a metropolitan environment, it's awkward and difficult to link networks together through gateways without running into some kind of degradation.

A: What we're describing here will be absolutely transparent to a user because it will all be done within the systems programming. It's just like people talking about X.25 or other protocols. Most people don't natively process those protocols. They merely transform them and then use proprietary protocols to move the data around, and that's usually transparent.

Q: What concerns are users expressing to you in terms of LU 6.2, and how soon do you expect to see it widely implemented in IBM networks?

A: The concern that I hear expressed is, "Why aren't you going faster?" The users would like to see LU 6.2 in all the IBM software products. I have really not had a customer sit me down and talk about some technical concern. Rather, they see LU 6.2 as a very good attachment strategy, a connectivity strategy. Many of our competitors have either announced the fact that they're going to implement LU 6.2 or they already have implemented it. [Digital Equipment Corp.] has accepted it, Data General [Corp.], Prime [Computer, Inc.] and on and on.

Q: How important to IBM is support of LU 6.2 by European standards organizations such as the European Computer Manufacturers Association (Ecma)?

A: Ecma came to us last summer and asked us if we would be willing to put LU 6.2 into the standards world. We replied in the affirmative, and they took a vote and said, "no thanks." I was disappointed with the outcome. We would like for them to have adopted LU 6.2 as a standard. The thing that is important to focus on is that LU 6.2 is here and now.

Q: Some users are saying that they are going to require that vendors offer LU 6.2 compatibility.

A: I think that will happen. As our customers want to have connectivity, that's one way they can ensure it. And what will we see a few years hence? We'll see ISDN as a requirement. I really believe that as ISDN becomes more of a global standard and a ubiquitous type of thing, customers will demand it.

Q: How, specifically, does IBM intend to participate in the world of ISDN?

A: Well, we're working in the standards bodies that are defining ISDN. I have said publicly that we are going to support ISDN. I think ISDN, if it unfolds as promised, will be good for the industry. Anything that allows people to connect things more easily — and that's what ISDN appears to me to be — holds great promise for our customers. And when that happens, it's usually good for us.

There's a lot of work that has to be done to define the standards. One of my concerns about ISDN is that every country has its own ISDN. It may happen that way, but it would be easier if the standards groups could bring it together and really have a worldwide ISDN. I suspect that we will have one ISDN, or close to it, in the U.S. I'd like to think it would be the same in Europe and in Asia, but that's yet to be determined. We're working on the data/voice pieces of ISDN right now, in terms of trying to look at products.

Q: Who do you report to? What is his role in the development of corporate communications strategies? And how are these strategies formulated at the highest echelons of IBM management?

A: I report to Mike Armstrong [an IBM senior vice-president, and group executive of the Information Systems and Communications Group]. In the normal course of the year, we'll go through two planning cycles. In the spring, we have a strategic planning cycle, an investment cycle, which looks out five years. So there's a five-year horizon in terms of the investments that I want to make in telecommunications and products that I plan to develop and get to the market. Armstrong, [Jack] Kuehler [an IBM senior vice-president], [John] Akers [as of June 1, IBM's chief executive officer and board chairman], Paul Rizzo [IBM vice-chairman of the board] and others all have a chance to look at that plan and agree or disagree.

In the fall, we have a two-year commitment plan cycle. There, we come in with a much tighter operating plan covering this year and next year, in terms of what our plans are, revenue, profit and all the things you'd expect to run a business on.

We had an executive conference, which is outside of that planning cycle, in the spring, which incidentally was hosted by Dennis Paboojian [of Rolm]. We had all of our senior executives there, and a major part of that was a review of our telecommunications strategy, which goes much beyond products. But we also talked about where we think we're taking the company in telecommunications and how important it is to our business. So that's a little bit out of the normal planning cycle, and I feel that we were able to articulate a strategy that everyone agreed to.

Q: How would you evaluate IBM's strengths and weaknesses in the research and development of telecommunications products?

A: That's a broad question. Let me give you one dimension of that. To strengthen what I'll call our research effort, we have formed the Advanced Telecommunication Systems Laboratory, which is a three-way effort between our research division, Rolm and [the] CPD. We have them working on the longer term — five- or 10-year issues that we want to get some specific focus on. But I wouldn't call this product development as much as it is research.

We've asked Jim Kasson [vice-president of research and development at Rolm] to coordinate that effort. It will involve our research crowd up in Yorktown, N.Y., and my sites, whether in Japan or La Gaude, [France], or Boca Raton, [Fla.], or Raleigh, [N.C.], or Kingston, [N.Y.], from more of a research standpoint. In our lexicon, research is a little further out. Development really means what it says — we're developing products.

Q: Fiber-optic transmission technologies seem to be improving geometrically, but we don't hear much about the processing and the switching. What progress has IBM made there?

A: I think fiber offers the promise of extremely high speeds to our customers. That's going to be an opportunity out in the future, but it's not something in the near term. When you think about the speeds in the 100- and 200-megabit range that fiber optics can offer you, all of a sudden, you can think of people who have very large host processors around the world who can treat them as if they were in the same room.

Q: We hear an awful lot of complaints about getting senior management involved, understanding communications technology and approving it. How do users break through and make senior management understand that it has to get involved if the company is going to be competitive?

A: We had the same challenge in computers. When computers first arrived on the scene back in the late 1950s and early 1960s and started to become pervasive, senior management started to get involved.

The way you helped them was by literally educating them through speeches, industry newspapers, classes and through articulate customer executives. The things that got them interested so they'd listen were cost — the investments they are making — and the attention computers were getting in the press.

Telecommunications is getting an awful lot of press and not just in the industry vertical press, but across the board. Look at most business publications. There's hardly a month that goes by that there isn't some general management topic on telecom. My experience from calling on senior executives with our customers is they're interested and willing to learn.

Q: The *IBM Systems Journal* recently reported that IBM researchers in France were experimenting with running voice over a token-ring network. What are the implications of that for users?

A: I don't know that that has any more implications than voice and data over digital facilities. It's just going to be another option that customers will want in the future.

Q: What unrealistic expectations do IBM users have of IBM?

A: I have grown up with customers, so I don't believe customers have unrealistic expectations. If they have expectations I haven't met, I've got to move faster. I think the people who manage in the communications arena — whether it be data, voice or the combination — have a fairly clear assessment of where the industry is today and where it's likely to be. I don't find people who are unrealistic.

I think everybody would like to go faster. They would like to see the standards come a little bit faster. They'd like networks to be easy to manage. Those are not unrealistic expectations. I'll tell you, if you ever meet a businessman who thinks his customers' expectations are unrealistic, he's not going to be in business very long.

Q: Users complain that they are generally confused and that the gap between users and vendors is widening, rather than closing. How is IBM working to resolve those two problems?

A: Customers are looking for integrated solutions. In the industry, there are many companies that make one or two niche products that get plugged into the network. But I think our customers really want people who will talk to them about system solutions. Their networks may include some of your products and some of somebody else's products, but they want to talk about network management of all of those products. They want somebody who can design it, install it and service it for them and have the same perspective that they have.

The analogy I use in the DP world is that 20 years ago, people liked to write their own operating systems. Today they don't want to spend any resources on that. Telecommunications falls into the same category today. The customer's real focus is on applications and how to get them developed, implemented and working.

They want to spend as little as they can on making telecommunications work for them. They don't want to buy nine different boxes and have to put them together and figure it all out. I think customers are right on insisting that you do something for them or you can't play in the game. We plan to play in the game.

NETWORK WORLD
THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES

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PLEASE ANSWER ALL QUESTIONS, SIGN AND DATE THE CARD.

1 **My primary areas of activity.** Circle ONE only.
I am involved in evaluating communications (data, voice and /or image) products and services:
1. for *use within my own* company/organization
2. for *resale* to other companies/organizations
3. Both

1a **For communications, my primary responsibility is:** Circle ONE only.
1. Data Communications
2. Voice Communications
3. Both

2 **Circle only the ONE title classification which most applies to you.**

Company Management

11. Chairman, Pres., Owner, Gen. Mgr., Partner, Director, CIO, VP, Dir. Head of Finance, Admin. Procurement

Communications Management

Data Communications
21. Management
    VP, Dir., Mgr., Head, Chief: Data Communications, including Networks, Engineering, Design, R&D, Application Development
22. Supervisory/Staff
    Supervisor, Head : Networking, Design, Analysis, Engineering, R&D, Applications, Services

Telecommunications
31. Management
    VP, Dir., Mgr., Head, Chief: Telecomm., Voice Comm., including Networks. Engineering, Design, R&D, Application Development
32. Supervisory/Staff
    Supervisor, Head: Networks, Design, Analysis, Engineering, R&D, Applications Services

Factory Communications
41. Management
42. Supervisory/Staff

MIS/Data Processing
51. Management
    VP, Dir., Mgr., Head, Chief: MIS/DP, Systems Application Development, Operations, Office Automation
52. Supervisory/Staff: Supervisor, Head of System Design, Analysis, Applications

Others
75. Consultant
80. Educator
85. Financial Analyst
90. Marketing/Sales
95. Other ______________

3 Job Function
Which one of the following best describes your functional involvement with communications (data, voice, and/or video) products? Circle ONE only.

Corporate
1. Business Management, Planning and/or Development

Communications System/Network
2. Management, Planning and/or Development
3. Implementation and/or Operation
4. Other ______________

4 **Which one of the following best describes the primary business activity of your organization at this location?** Circle ONE only.

Consultants
11. DP/Communications Consulting Services
12. Consulting Services (except DP/Communications)

End Users
13. Manufacturer (other than computer/communications)
22. Finance/Banking/Insurance/Real Estate
23. Education
24. Medicine/Law
25. Wholesale/Retail Trade
26. Public Utility/Transportation
27. Mining/Construction/Petroleum Refining/Agriculture/Forestry
28. Business Services (excluding DP/Communications)
29. Government: Federal
30. Government: State/Local

Vendors
41. Carrier: including AT&T, BOCs, Independent Telcos, Public Data Networks, Intern'l Records Carriers
42. Interconnect
43. Manufacturer Computer/Communications Equipment
44. Value Added Reseller (VAR), Systems House, Systems Integrator
45. Distributor
46. DP/Communications Services (excluding consulting)
95. Other ______________

5 **In which ways do you typically become involved in acquiring communications products (data, voice, and/or video) and services?** Circle ALL that apply.
1. Recommend/Specify
2. Identify/Evaluate Potential Vendors
3. Approve the Acquisition
4. None of the Above

6 **Check ALL that apply in columns A and B.**
A. I am personally involved in the acquisition process (specification, selection, approval) for the following products and services:
B. These products and services are presently in use at this location:

	A	B	*Product/Services*
Computers			
01.	☐	☐	Micros
02.	☐	☐	Minis
03.	☐	☐	Mainframes
Data Communications			
04.	☐	☐	Communications Processors
05.	☐	☐	Comm./Networks Software
06.	☐	☐	Digital Switching Equipment
07.	☐	☐	Facsimile
08.	☐	☐	Modems
09.	☐	☐	Multiplexers
10.	☐	☐	Protocol Converters
11.	☐	☐	Network Mgmt. & Control
12.	☐	☐	Test Equipment
13.	☐	☐	3270 Controllers
Telecommunications			
14.	☐	☐	PBXs
15.	☐	☐	Key Systems
16.	☐	☐	Central Office Equipment
17.	☐	☐	Integrated Voice/Data Terminals

	A	B	*Product/Services*
Transmission/Network Services Equipment			
18.	☐	☐	Microwave
19.	☐	☐	Satellite Earth Stations
20.	☐	☐	Local Area Networks
21.	☐	☐	Wide Area Networks
22.	☐	☐	Packet Switching Equipment
23.	☐	☐	Fiber Optic Equipment
Communications Services			
24.	☐	☐	Packet Switching Services
25.	☐	☐	Cellular Mobile Radio Services
26.	☐	☐	Electronic Mail
27.	☐	☐	Enhanced Services
28.	☐	☐	Centrex

7 **Estimated value of communications systems, equipment and services:**
A. which you helped specify, recommend or approve in *last* 12 months? Check only ONE in column A.
B. which you plan to specify, recommend or approve in *next* 12 months? Check only ONE in column B.

	A	B	
1.	☐	☐	Over 10 million
2.	☐	☐	$5-10 million
3.	☐	☐	$1-5 million
4.	☐	☐	$500,000-1 million
5.	☐	☐	$250,000-500,000
6.	☐	☐	$100,000-250,000
7.	☐	☐	$50,000-100,000
8.	☐	☐	Under 50,000
9.	☐	☐	Don't know

8 **Estimated gross annual revenues for your entire company/institution:**
Circle only ONE.
1. Over $1 billion
2. $100 million to $1 billion
3. $5 million to $100 million
4. Under $5 million

9 **Estimated number of total employees at this location:**
Circle only ONE.
1. Over 5,000
2. 1,000-4,999
3. 500-999
4. 250-499
5. 100-249
6. 50-99
7. 20-49
8. 1-19

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ICA from page 1

organization (see "AT&T shuffles leadership," page 2) and discuss the telecommunications giant's future marketing strategy in light of the Federal Communications Commission's Third Computer Inquiry ruling.

The show, which starts June 1, may merit some major product announcements, but analysts feel slumping first quarter sales and user uncertainty about the impact of tax law revisions on capital depreciation have encouraged vendors to enhance existing products and broaden low-end product offerings.

AT&T, Northern Telecom, Inc. and Racal-Milgo, Inc. are among the vendors expected to use the conference to showcase new products. IBM and others will be displaying recently introduced communications wares.

Besides the heavy integrated services digital network push AT&T will make at the show, AT&T Information Systems sources say that the company will announce several enhancements to its System 75 private branch exchange.

Enhancements will include a version of AT&T's Audix Voice Mail for the System 75, a feature previously only supported on the high-end System 85, and support of Automatic Call Distribution (ACD). ACD is used for telemarketing and other applications requiring large numbers of incoming calls to be distributed to waiting operators. New hospitality features will also be added to the System 75, including automatic wake-up and message waiting.

AT&T is expected to announce a little brother to the System 75 later in the month rather than at the show. Rolm Corp., however, may unveil its 150-line low-end Redwood PBX at the company's scheduled press briefing. Interestingly, Rolm and IBM will share a booth to codisplay products.

Northern Telecom sources say the company will introduce new processor options at the show for the Meridian SL-1N and SL1-XN that will increase the number of ports supported by both PBXs. Outfitted with the options, the smaller 1,500-line switch will be known as the SL-1NT and the larger 5,000-line PBX as the SL-1XT. Present SL-1s can be field-upgraded. Northern Telecom's Spectron division is also introducing new data network test equipment.

Frank Dzubeck, president of Communications Network Architects, Inc., a Washington, D.C.-based consulting firm, feels vendors may unveil repackaged versions of existing products and lower prices to stimulate sales. "They're getting to the point where they've got to increase sales so they're attacking different money at the lower end of the marketplace," Dzubeck said.

Ian Angus, president of Angus Telematics Group, sees the lower end PBX offerings targeted at meeting the departmental needs of large corporations. "The big users have many small offices and departments that need full-featured low-cost systems."

Joaquin Gonzalez, program director for strategies in telecommunications for the Stamford, Conn.-based consulting firm, The Gartner Group, said that, rather than look for sexy new products, telecommunications managers at the show will concentrate more on discovering how to utilize existing products and technology better.

In addition to the PBXs, vendors are expected to show off their latest products supporting the ISDN concept. But analysts feel few real ISDN advancements will be unveiled at the show because of a lack of defined standards.

One major announcement many thought would be made at the show actually came last week when IBM introduced new front-end processors, modems and network management software (see "IBM unifies network management tools," page 1). Conspicuously absent from last week's IBM announcement was the long-rumored 81-C, the terminal controller expected to supercede the 3274, leaving many to speculate Big Blue may still use ICA to stage an announcement.

Many vendors are expected to announce T-1 products. Racal-Milgo said it will add to its product line with the introduction of a local T-1 multiplexer and modem. The company will also unveil two other multiplexers and a modem for building or campus environments. The products are all fiber-based.

Summing up his feelings on the upcoming show, Dzubeck said, "Everything that's going to be announced is anticlimactic. And people who are looking on the horizon for ISDN are thinking wishfully.'

Plastics from page 30

transaction authorization, smart cards eliminate much of the need for data communications with other computers.

The use of smart cards facilitates the operation of noncash payment systems for banks and retailers and represents a reduced market opportunity for networks.

However, smart card technology has been in a pilot test stage for more than 10 years and is not yet ready for the market. Users will continue to rely on networks for the next three to five years.

Shared services from page 31

in this developing industry, what would it be?

It would be beneficial if we had a supplier or host of these services that had guidelines or standards. We could then compare capabilities and products of the different vendors.

The next step would be to extend that standardization to the tenants so that they could also have a higher level of confidence in selecting different services and in taking full advantage of them.

Why do you believe that this intelligent building concept is important?

There is an underlying current of change in society driven by the application of technology to all areas of business.

We in the real estate business must understand that driving force and see how it reshapes our own industry. This is a concept that our industry should understand, if not actually implement. We have only seen the tip of the iceberg.

ISDN from page 4

dard specifications emerge.

First samples of the S/T interface chip are due in November 1986, and samples of the U interface chip will be available sometime in 1988. Motorola will also market the chips to other telecommunications equipment manufacturers.

Northern Telecom also announced a switching product, the Dynamic Network Gateway (DNG-1), which will be delivered in the second quarter of 1987. The DNG-1 is a customer premises device that works in conjunction with the company's DMS-100 central office digital switching system.

The DNG-1 is a switch that can support up to 1,200 devices in a star network topology at speeds up to 2.56M bit/sec. The product supports both synchronous and asynchronous transmissions and could enable networked personal computers, for example, to exchange files.

The DNG-1 can support voice and data over standard twisted-pair wire using an integrated voice data module; data rates can range in speed up to 19.2K bit/sec. Users will be able to connect to a wide-area network through Northern Telecom's Datapath circuit-switched data access system.

GTE Communication Systems Corp. introduced the MLC Series 24 for telephone companies. This 24-channel digital modular-loop-carrier system is based on T-1 technology and supports transmission of voice and data to multiple, dispersed subscribers. The MLC 24 is the first in a series of products the company plans to offer to help telephone companies' transition to ISDN.

Fujitsu America, Inc., headquartered in San Jose, Calif., announced a package of fiber-optic-based digital transmission products designed for local-loop and interoffice telephone company applications. The local loop provides telephone service between a telephone company's central office and its subscribers. The company says the fiber products will enable telephone companies to offer local users a large, expandable and relatively inexpensive pipeline.

AT&T from page 2

verage networking skills. Most industry analysts, however, have pointed to the marketing and financial weakness the company has shown in the areas of mid-range and large computer systems. And few are convinced the company can successfully reunite its vastly profitable long-distance business with AT&T Information Systems, which has lost hundreds of millions of dollars in a scant two years.

While the company struggles to reassemble these forces and redistribute its costs, its competition is working quickly — without AT&T's federal and regulatory shackles — to build its own single solution to user needs.

AT&T has a long way to go to prove its solid strategy to investors, analysts and its coveted large users. One observer last week suggested the company's disappointing sales of mid-range computers indicates that a basic strategy change is in order. That area has traditionally been an IBM weakness.

New thrust for ISDN

Olson insisted there was no mystery to the company's basic strategic direction. "I'm not going to give you a blueprint," he said. "That's just what our competitors would like. Computers remain very important to us.

"There's a huge data-networking business out there, and AT&T hasn't been very much a part of it," he continued. "There's a new thrust for ISDN. Our strategy is going to unfold over the years ahead on an international basis. I'm not going to be any more definitive than that."

Rules from page 4

integrated services digital networks, for which standards are still being defined, as the answer to an open architecture. However, Pacific Bell's Adamson noted, "ISDN has to be able to accommodate the CEI principles."

> *"The ultimate challenge is whether the standards will be good enough."*

Discussions on ISDN focused on upcoming trials and the need for telephone operating companies to uncover applications for the technology. Most telephone companies are planning multiple field tests with equipment from a range of vendors. Several speakers noted that vendors are taking individual approaches in developing ISDN equipment, posing potentially serious problems.

"The ultimate challenge is whether the standards will be good enough so people can walk into any room and use a telephone without sheets of instructions," said Gary Handler, vice-president of network planning for Bell Communications

See **Rules** page 43

Wang from **page 1**

would aggressively pursue a strategy aimed at becoming a single-source provider to users of large integrated voice/data networks and systems.

High-end PBX supplier

To date, Intecom has been known primarily as a high-end private branch exchange supplier with a solid, front-line product. But sluggish sales, eroding profit margins and bad publicity caused industry observers to speculate that the company's only chance for survival lay in being acquired by a company with a wider market presence.

News of Intecom's acquisition by Wang later in the week was greeted with puzzlement by industry analysts.

In fact, it was reported that another company had made an offer to buy Intecom — an offer that Wang allegedly countered by agreeing to increase its current 20% equity stake to full ownership. Ralph Thornton, Intecom's vice-president of administration, would not comment on the report.

Intecom said last week's introduction of four new products was the first step in its product strategy, which will be implemented in four phases and will involve further connectivity with Wang's product line. The final intent is to become an end-to-end supplier of switching and transmission systems.

The company said its sales force will begin marketing the Wang product line, including the Wang DVX voice store-and-forward system.

The company also may develop and sell central office equipment to regional Bell operating companies, according to Hal Denton, Intecom's director of product marketing. Five RBOCs are currently distributing the company's IBX PBX product line.

According to terms of the merger agreement, which is subject to U.S. Security and Exchange Commission and shareholder approval, Wang secured the right to acquire those parts of Intecom currently owned by Exxon Corp. and "certain other founding shareholders" who collectively control 35% of the company.

"The merger guarantees that our synergy with Wang can continue," Thornton said.

"There was a question of whether Intecom as a company is big enough to really play in the game with AT&T, Northern Telecom and Rolm/IBM. The merger answers that question."

According to George Colony of Forrester Research, Inc. in Cambridge, Mass., the Wang acquisition "doesn't make much sense." He said that product synergy between Wang and Intecom has been lacking.

In view of the increased synergy with Wang that Intecom's product announcements of last week brought about, Colony said, the merger seemed unnecessary.

Intecom want openness

"Intecom wants [its switches] to be very open with Wang [office automation systems] and with other vendors as well. Wang is playing the same game itself. If you can own part of the company and still get the same synergy, why buy the whole company?"

Products announced by Intecom last week included a component for the IBM system called Flex Interface Multiplexer, which uses custom circuitry to decrease the footprint of stacked switches by 89% and offers greater flexibility in configuring the system.

Intecom introduced the first of a series of data add-ons, the ADI-100 modular data interface. Also unveiled was an enhancement to Intecom's current fiber transmission system, Fiber II, that is said to significantly improve wiring options. According to Hal Denton Fiber II is now installed at the University of Minnesota, where it increased distancing from 20,000 to 40,000 feet. ◪

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- Reports on how other users are solving their communications problems and how you might take advantage of the lessons learned by others. No need to "reinvent the wheel."
- Coverage of regulatory issues and how they will impact business communications. (Network World's Washington bureau is right on top of everything that's happening, and our editors see it from the user's point of view.)

Vsat from **page 5**

must report this data to the FCC for the first time on Nov. 30 and every six months thereafter.

Philip Spector, a partner in the Washington, D.C.-based law firm Goldberg and Spector and legal counsel to Equatorial, said the company is currently evaluating its appeal options. "We think the AT&T service is priced with an intent to drive out competitors and is deceptive from a customer point of view."

AT&T Communications spokesman Jim Byrnes said, "We are confident we have a service that will be attractive in the marketplace. We feel it's only fair that we be allowed to compete in this marketplace."

The entry of AT&T Communications into the Vsat service fray is expected to increase interest in the technology as an alternative to private-line services. As the largest supplier of leased lines, AT&T's market entrance legitimizes the technology.

Users such as Farmers Insurance Group in Los Angeles, Federal Express Corp. of Memphis, Tenn., and Halliburton Co. in Dallas have opted for Vsat-based networks. ☒

Rules from **page 41**

Research Corp. in Livingston, N.J.

The network vendors may ultimately be the ones that will pull ISDN together, according to Joseph Miller, district staff manager for new architectures planning at Mountain Bell in Denver.

Another challenge

Another important challenge facing network providers is coming up with ISDN services that appeal to users.

When asked what kind of services they need, users' responses are often colored by their preconceptions of what ISDN technology can provide, Miller said. He also said it was imperative that the network providers stimulate vendors of customer premises equipment to develop ISDN terminal equipment. ☒

DEC from **page 2**

The Conference of European Postal and Telecommunications, which makes recommendations to national Postal Telephone and Telegraph agencies, developed A311 to specify how private E-mail systems should be interfaced to wide-area network services.

Cen/Cenlec, a group of European standards-making bodies, developed A3211 to specify how two private-domain mail networks should be interconnected. NBS/X.400 is a subset of A3211.

The Message Router X.400 Gateway can be used on any VAX series processor that supports DECnet Phase IV. Other requirements include Version 4.4 of VAX/VMS or MicroVMS, a version of DEC's Packetnet System Interface, and Version 1.1 of DEC's VAX OSI Transport Service.

Scheduled for July availability, the X.400 Gateway is expected to cost between $2,400 and $12,000.

DEC also announced software that conforms to the fifth, or session, layer of the OSI model. The VAX OSI Applications Kernel Software implements the OSI session layer as defined by International Standards 8326 and 8327, according to David Korf, DEC's multivendor networking marketing manager.

Users will be able to incorporate the software into their applications to communicate with other applications, Korf said. The software is scheduled to be available in July and will cost between $1,380 and $6,900.

"From the users standpoint, the objective of OSI is to make it possible to buy off-the-shelf commercial products and have the systems work together," said Bob Blanc, director of NBS's center for computer systems engineering. "I would think that in the next few years there will be a large number of announcements [similar to this DEC announcement]." ☒

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May 28-29, Boston — Planning Telecommunications Networks. Also, Nov. 12-13, Washington, D.C.; Dec. 10-11, San Francisco. Contact: Marji Clark, International Data Corp., Washington Division, 1500 Planning Research Drive, Suite 240, McLean, Va. 22102-5096.

May 28-30, New York — Data Network Design and Performance. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

May 28-30, San Diego — SNA: Concepts, Design and Implementation. Also, June 18-20, Arlington, Va.; July 9-11, Scottsdale, Ariz.; July 30-Aug. 1, Palo Alto, Calif. Contact: Center for Advanced Professional Education, 1820 E. Garry St., Suite 110, Santa Ana, Calif. 92705.

May 30-June 2, Atlanta — The Society of Telecommunications Consultants Spring Conference. Contact: Society of Telecommunications Consultants, One Rockefeller Plaza, Suite 1410, New York, N.Y. 10020.

June 1-6, Atlanta — Telecom '86: Telecommunications — A Strategic Asset. Contact: Stephen Christie, International Communications Association, Suite 710, 12750 Merit, Dallas, Texas 75251.

June 2-4, Boston — Hands-On Network Protocols: An Advanced Approach. Contact: American Institute, 55 Main St., Madison, N.J. 07940.

June 3, New York — Telecommunications Equipment and Services Selection. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 3-4, Washington, D.C. — New Light on Fiber Optics: Supply & Demand Heats Up. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

June 4, Bethesda, Md. — Data Communications for the IBM PC: PC to PC and PC to Mainframe Communications in One Day. Contact: The Institute for Advanced Computer Education, 3233 K St. N.W., Washington, D.C. 20007.

June 5-6, Orlando, Fla. — Fiber Optics in Plain English. Also, June 25-26, Hartford, Conn.; July 16-17, Los Angeles; Aug. 6-7, Chicago. Contact: R. Skinner, Clifford, Inc., P.O. Box 51, Bethel, Vt. 05032.

June 5-6, Bethesda, Md. — Installing and Using the IBM Token-Ring Network and other PC Lans. Contact: The Institute for Advanced Computer Education, 3233 K St. N.W., Washington, D.C. 20007.

June 9-10, Chicago — Computer-to-Computer: The Office Products Industry in an Electronic Age. Contact: Communications Department, National Office Products Association, 301 N. Fairfax St., Alexandria, Va. 22314.

June 9-10, Minneapolis — Networking IBM Personal Computers. Also, June 11-12, St. Louis, Mo.; June 16-17, Columbus, Ohio; June 18-19, Milwaukee. Contact: Center for Advanced Professional Education, 1820 E. Garry St., Suite 110, Santa Ana, Calif. 92705.

June 9-11, Chicago — Network Management, Control and Problem Determination. Also, Oct. 1-3, New York; Nov. 17-18, San Francisco; Dec. 10-12, Boston. Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521-2939.

June 9-12, Boston — Network Management/Technical Control Conference and Exposition. Contact: Registration Services, CW/Conference Management Group, Box 9171, Framingham, Mass. 01701-9171.

June 9-13, St. Louis, Mo. — Reach for the Top in St. Louis — 23rd Annual Conference and Technical Exhibition. Contact: Nancy Montenegro, American Society for Hospital Engineering, 840 North Lake Shore Drive, Chicago, Ill. 60611.

June 12-13, St. Louis, Mo. — Data Communications and Networking for the IBM PC XT/AT and Other Compatibles. Also, July 10-11, Baltimore; July 24-25, Hartford, Conn.; July 28-29, New York; Aug. 11-12, Boston. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

June 16-17, San Francisco — Transmission Technologies: Optical Fibers, Coax and Wire. Also, July 7-8, Washington, D.C.; July 10-11, Chicago. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 16-18, Washington, D.C. — Fundamentals of Telecommunications: Voice, Data and Image. Also, June 24-26, Phoenix, Ariz.; June 30-July 2, St. Louis, Mo.; July 8-10, West Palm Beach, Fla.; July 22-24, Salt Lake City, Utah. Contact: The American Institute, 55 Main St., Madison, N.J. 07940

June 19-20, Las Vegas, Nev. — Gartner Group's Fourth Annual IBM Futures Conference. Contact: Ashley Pearce, Gartner Group, Inc., P.O. Box 10212, Stamford, Conn. 06904.

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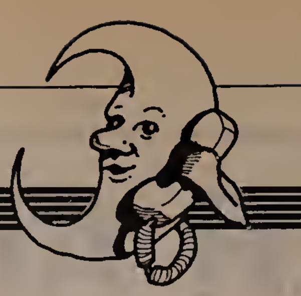
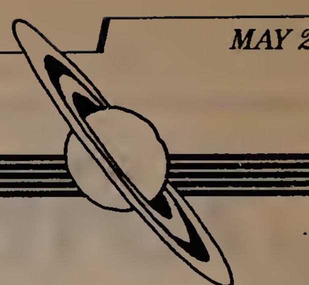




HORRELLSCOPES

BY EDWARD HORRELL

In communications today, it takes more than good business sense to survive; it requires celestial guidance.

Virgo: This is the sign of retiring AT&T Chairman Charles Brown.

One of the many dumb things U.S. corporations do is boot out employees after a certain age. Other countries, notably Japan, respect the age and wisdom that older employees bring to their jobs.

How much longer are the brightest stars of business and industry going to be cast outside the constellation? Probably as long as the U.S. is content to let Japan run over it technologically.

Charles Brown led AT&T through divestiture, MCI Communications Corp.'s challenge and numerous star wars with long-distance companies and his own shareholders.

Through it all, he had style.

True to his birth sign, Brown has sharp intelligence, an eye for perfection and keen insight. Brown was born in the earlier sphere of the sign and is, therefore, the true communicator of Virgo: perpetually young, active and visible.

It would be nice to picture this Virgo retiring from AT&T and coming back with a struggling young telecommunications company. Then the industry would really see what class management is all about.

How 'bout it, Virgo? You know you can't resist.

Sagittarius: The hunger this month is McDonald's, the fast hamburger chain looking for more information.

Under the golden arches across the U.S., and in conjunction with Illinois Bell, McDonald's is going to test a major integrated services digital network. The announced trial shows the continued importance of information movement to all types of businesses. McDonald's hopes to maintain its competitive edge by moving more information over fewer wires.

Horrellscopes wishes they'd put as much effort into getting more french fries into the little bags.

Aries: A large number of AT&T System 85 users are butting their heads against a brick wall.

The private branch exchange System 85 is the scintillating star from AT&T, yet users are extremely unhappy with the documentation, support and flow of information about the system from AT&T. It appears that the bureaucracy surrounding this planet is creating potential cosmic catastrophes. Indeed, AT&T marketing reps are speaking of the "sales prevention team," the process for handling new orders. (Horrellscopes has learned that AT&T requested a credit report for the largest private hospital in the country.)

AT&T has got to alter its course on this one.

If any system should be supported with sophisticated assistance and information for both the seller and buyer, the System 85 is it. The system is aimed at major users and is the most complicated — not to mention the most expensive — in AT&T's galaxy.

AT&T needs to decentralize and give more freedom, information and authority to its local offices. What's the company afraid of? Doesn't it think it has competent people in these local offices?

System 85 users are becoming very loud and uneasy. AT&T needs to ram through in-house improvements fast.

Taurus: The bullheaded sign hangs over Image Data Corp. in San Antonio, Texas.

Even though one of the biggest failures of the 1960s was the AT&T Picturephone, Image Data was bullheaded and held onto the notion that television and telephones could be married.

Now it has a hot new product in a hot new industry.

Its Photophone combines a telephone and Picturephone by sending a picture over a TV-type device in eight seconds. It uses regular telephone lines, and it costs only $8,500 per phone.

The 1960s AT&T disaster was expensive and offered such poor quality that one observer said using it was like "talking to a socially deficient foreigner."

But Image Data has worked out the bugs. While the Photophone does not provide full-motion video, the picture quality is acceptable for X-rays, patient charts, pictures and drawings. And for those not requiring the quality of Photophone, Luma Telecom of Santa Clara, Calif., has introduced a lesser version at about $1,500 per set.

These are the kinds of technological changes users like, because they can literally see them. Watch for the bigger stars, such as Northern Telecom, Inc., AT&T and Rolm Corp., to pay special attention to the paths of these comets.

Shooting stars.

Some regulators and communications industry competitors might think that shooting is too good for heavenly bodies that line up together for their own benefit.

It's too early to get a fix on this, but Horrellscopes has spotted what appears to be a purchasing network made up of IBM, Rolm, Satellite Business Systems, MCI and Network Equipment Technologies Co. If the signs are right about this, the network is designed to join the considerable forces of these big bodies and offer ease in purchasing decisions for big users.

This is a meteor shower worth watching.

Libra: Some balance is needed in the upcoming negotiations between the Communications Workers of America (CWA) and the telecommunications companies.

The Bell operating companies and AT&T each have CWA contracts coming up for renegotiation shortly.

These contracts will be the path other stars will follow in their negotiations.

No stargazer is necessary to point out the differences between the CWA and the telecommunications firms: The firms say they're faced with competitors that use lower labor costs to offer lower prices to customers, and the CWA says the companies could make more money if they'd cut back on top management. Both sides could stand for a little less Taurus droppings on this one.

Advantage: The BOCs. They offer, and will continue to offer, services unique enough to justify special prices. But there are too many AT&T look-alike competitors for this big planet for AT&T to be completely noncompetitive price-wise.

Cosmic catastrophe of the month.

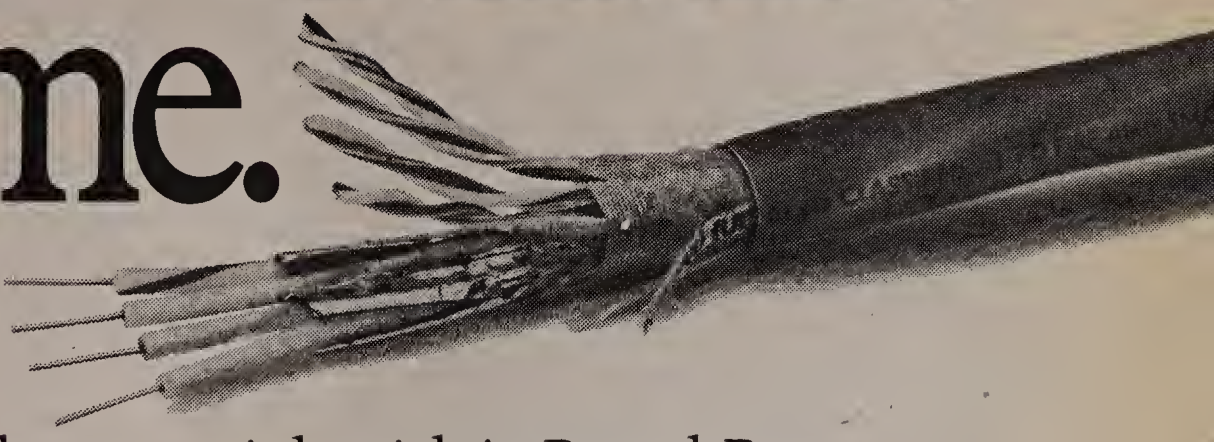
What is that noise bouncing off the planets? Is it the weeping and wailing of long-distance telephone companies? Or could it be the death knell of some of these ding-a-ling firms?

AT&T has asked the Federal Communications Commission for lower rates for long-distance services. The request would reduce rates 9.5%, for a total reduction of $1.5 billion.

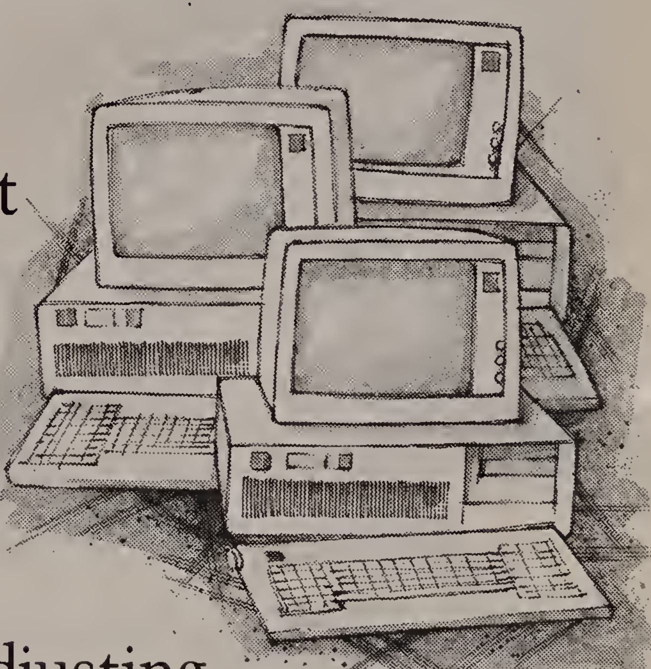
If the approval goes through, and it should, competitors will have to respond. It'll mean tough times in a business with an already slim profit margin. Resale carriers — those who buy volume from AT&T and resell it at a profit — will be hit especially hard.

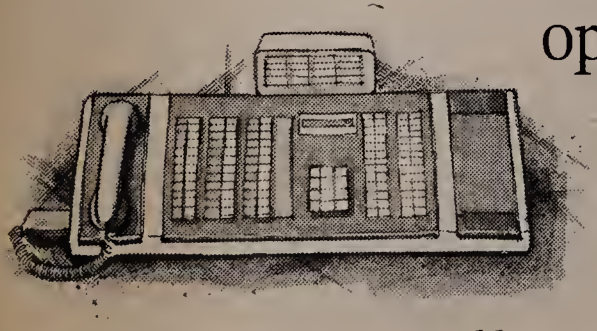
The survivors? Those who emphasize creative services and features. Doomed are those who offer a less expensive, me-too version of AT&T.

Why IBM built 10,000 miles of LAN on one name.



When something works, you stick with it. Brand-Rex was the first to perfect a system to support the complex token ring Local Area Network (LAN) in IBM's own facilities. That's why IBM has ordered more than 10,000 miles of cable to link voice and data communications for itself and its customers. It's called the IBM® Cabling System. And it's the first ever to enable a single, "wire-once" medium to connect all the computers, terminals, work stations, telephones and PBXs within a site. A compact package of shielded twisted pairs, it runs from standard face plates to a patch panel which sends signals to any number of devices. So re-wiring is as easy as adjusting the panel and moving plugs from one socket to another. Cable made by Brand-Rex is the backbone of more than 90% of the token ring LANs operating today. That's the track record IBM builds on. Make sure you do, too. Write for our *IBM® Cabling System* technical bulletin from Brand-Rex Cable Systems Division, BRIntec Corporation, 1600 West Main Street, Willimantic, CT 06226. Or call us directly at 203-456-8000.





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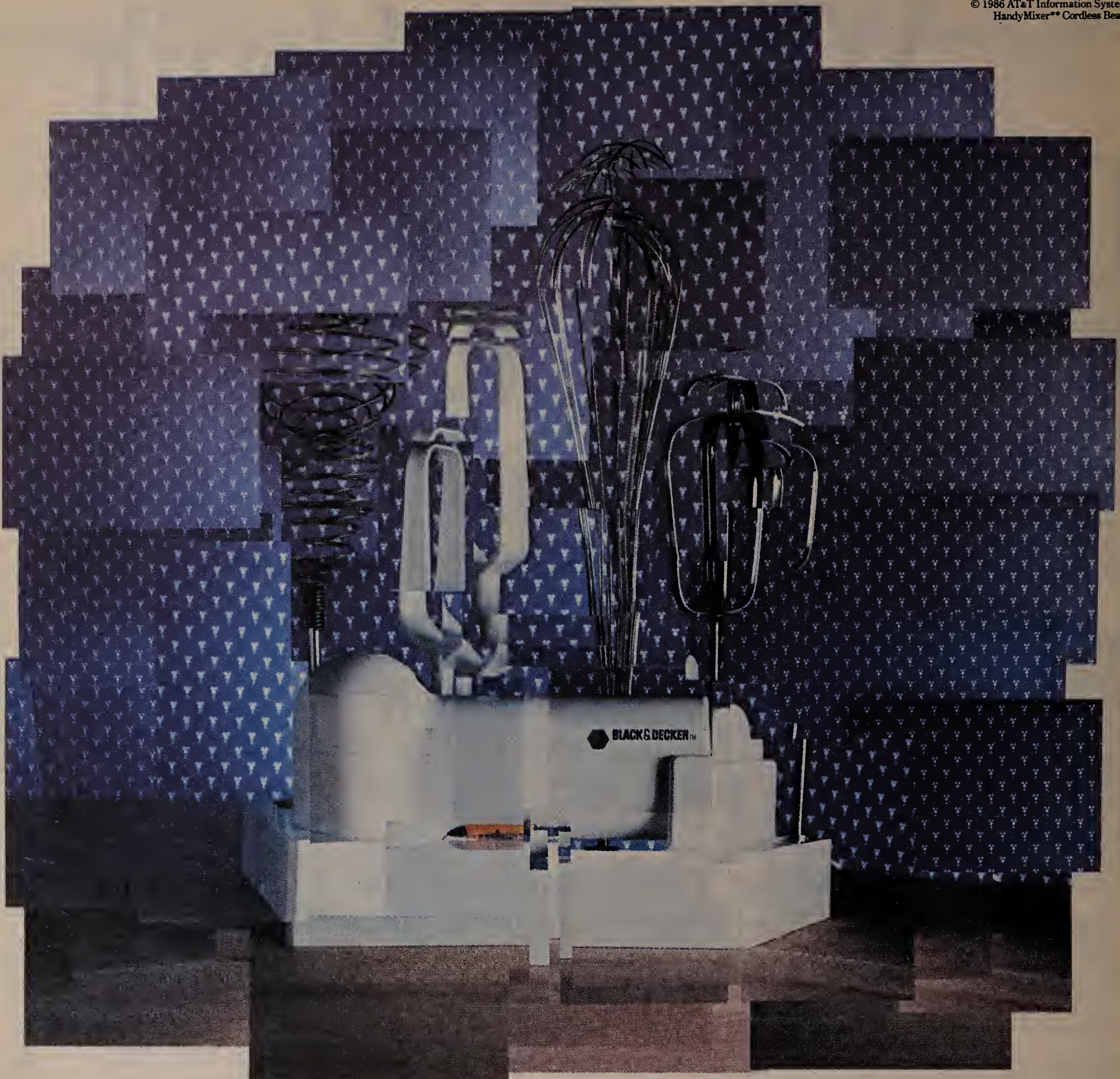

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